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Abstract. The article discusses some current issues of interpreting out-of-vocabulary words by modern machine translation systems (MT systems) in the context of changing forms and ways of maintaining an automatic dictionary. It provides a critical outline of the typology of MT systems and strategies for their development. It describes the impact of fast developing software and technologies on these strategies and analyzes the changes they bring into the forms of dictionary support. The research shows that the linguistic support and the structure of automatic dictionaries, whatever the MT system is, are fundamentally important for ensuring the quality of translation. Despite all the success of neural MT (NMT) systems, their automatically updated vocabulary databases do not record words characterized by terminological specificity and low frequency in the special texts and text corpora on which the system is trained. Analysis of translations performed by two popular NMT systems – Google Translate and Yandex Translate – has proven that they fail to process and unify the translation of words that are not entered in the system dictionaries, a task used to be solved easily by users of all types of MT systems with the help of automatic dictionaries. With statistic-based automatic dictionaries it remains a pressing problem and requires a special approach when editing MP results.

Key words: machine translation, machine translation strategy, typology of machine translation systems, automatic dictionary, out-of-vocabulary words, linguistic support.

ЛЕКСИКОГРАФИЧЕСКИЕ ПРОБЛЕМЫ СИСТЕМ МАШИННОГО ПЕРЕВОДА: НА ПУТИ ОТ БУКВАЛЬНОГО ДО НЕЙРОННОГО

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Аннотация. В статье рассматриваются актуальные вопросы интерпретации современными системами машинного перевода (МП) лексики, неизвестной этим системам (out-of-vocabulary words), в контексте изменений форм и ведения автоматического словаря. Дан критический очерк типологии систем МП и стратегий их развития. Описаны особенности этих стратегий и влияние на них развивающихся программных средств и технологий. Проанализированы формы ведения словарной поддержки, меняющиеся под воздействием технологических условий. Показано, что при любой системе МП ее лингвистическое обеспечение и структура автоматических словарей становятся принципиально важными для поддержания качества перевода. При всем успехе развития нейронных систем МП (НМП) их автоматически пополняемые словарные базы не фиксируют слова, характеризующиеся терминологической спецификой и низкой частотой в массивах и корпусах текстов, на которых обучается система. На примере анализа результатов двух востребованных НМП – Google Translate и Yandex Translate – доказано, что обработка и унификация перевода слов, не вошедших в словари системы, прежде легко решавшаяся пользователями всех типов систем МП на основе пополнения и ведения автоматического словаря, остается по-прежнему актуальной проблемой и требует особого подхода при редактировании результатов НМП.

Ключевые слова: машинный перевод, стратегия машинного перевода, типология систем машинного перевода, автоматический словарь, неизвестное слово, лингвистическая поддержка.

Введение

Длинный путь, пройденный прикладной лингвистикой от идеи машинного перевода (далее – МП) до ее современной реализации в виде сетевых систем нейронного перевода, требует осмысления тех трудностей, с которыми сталкивались разработчики лингвистического и программного обеспечения систем. Начавшись с чудовищной по затратам труда разработки автоматических словарей и процедур бинарного МП, пройдя через изменения самого парка компьютеров, современные сетевые системы предлагают высокий уровень перевода.

Тип конкретной системы МП определяется особенностями реализованных в нем грамматических (лексических, грамматических и собственно синтаксических анализаторов – парсеров) и программных средств. Однако часть лексических проблем, в частности обработка слов, не вошедших в словари системы, которые легко решались пользователями всех типов систем МП, осталась по-прежнему актуальной и требует особого подхода при редактировании результатов МП.

Развитие идеологии и теории машинного перевода и разработка систем, реализующих предлагаемые разработчиками подходы, всегда непосредственно зависели от уровня вычислительной техники: скорости обработки текста в оперативной памяти, скорости обмена с внешними (периферийными) устройствами, объемом этих устройств и памяти конкретного компьютера, универсальности программного обеспечения системы МП или его зависи-

мости от типа доступного разработчикам устройства [Almansoori et al., 2020].

Огромные усилия в ранние годы МП были потрачены на преодоление технических трудностей, особенностей представления текста в цифровой форме, его перфорацию, детальную проверку результатов перфорации и преодоление ограничений перфорационной техники с точки зрения полноты алфавитов, отсутствия надстрочных знаков и т. п. Сложность оцифровки печатных текстов была несколько снижена разработкой и усовершенствованием сканирующих устройств, первые из которых способны были распознавать только один шрифт и требовали специальной сложной перенастройки на другой. Появление современного типографского оборудования, мощных сканеров и соответствующего программного обеспечения облегчили перевод текстов в цифровую форму и позволили оперативно создавать и корпуса текстов, и базы данных.

Довольно долго накапливаемые массивы текстов использовались при создании автоматических словарей систем МП для извлечения актуальной лексики и ее дальнейшего преобразования в форму, требуемую конкретной системой МП, для исследования грамматических особенностей текстов и разработки соответствующих алгоритмов, основанных прежде всего на внесении в автоматический словарь специальных характеристик лексических единиц (слов и оборотов), используемых в дальнейшем при реализации алгоритмов синтаксического анализа (парсинга) [Dankers, Bruni, Hupkes, 2022].

Традиционно в любой системе МП принято выделять грамматические алгоритмы и лингвистическое обеспечение – автоматический словарь или словари, однако подход к структуре, составу и способам взаимодействия этих компонентов обусловлен функциями системы [Brottrager et al., 2022; Беляева, 2022]. Выбор конкретной стратегии машинного перевода является и теоретической, и практической проблемой МП. Этот выбор сводится к обсуждению возможных теоретических стратегий, в число которых входят традиционные подходы: прямой бинарный МП, разные версии перевода с трансфером (см., например: [Zhuang et al., 2021; Tars, Tättar, Fišel, 2022]) и расширенными сетями переходов, перевод

с языком-посредником; а также новые стратегии: статистический МП и нейронный МП [Zhu et al., 2022].

При всем разнообразии существующих систем МП их типологические различия по-прежнему определяются спецификой реализованных в них грамматических, лексических и программных средств.

Дискуссия

Опыт построения и эксплуатации давно применяемых систем *прямого бинарного МП* показывает, что эффективность этих систем обеспечивается в основном за счет мощных словарных средств, накопленных за десятилетия их функционирования, и специальных средств редактирования. Однако прямое бинарное сопоставление, осуществляемое на основе отдельных лексико-морфологических и семантико-синтаксических подструктур, жестко ориентирует лингвистическое и программное обеспечение системы не только на особенности конкретной пары языков, но и на специфику подъязыков. Замена одного из членов такой пары немедленно требует перестройки лингвистического, а иногда и программного обеспечения.

Вторая стратегия, предусматривающая *применение трансфера в системах МП*, основывается на теоретическом предположении о невозможности создания записи для прямой связи текстов разных языков. Эта связь может быть установлена только путем последовательных преобразований на различных уровнях репрезентации: лексическом, морфологическом, уровне синтаксических структур (в терминах конфигурационного и реляционного синтаксиса) и на уровне синтаксического описания, для чего активно используются варианты расширенных сетей перевода.

Использование трансфера предполагает последовательный переход от поддеревьев, описывающих структуру входного предложения на различных уровнях анализа, к глубинной ролевой структуре, используемой в качестве базового грамматического представления, и далее к входным поддеревьям. При этом использование процедуры преобразования именно для локальных поддеревьев позволяет получать МП, не моделируя пол-

ное понимание предложения. Решение этой задачи не обязательно при МП, так как глубинные семантико-синтаксические интерпретации могут быть оставлены человеку-пользователю, то есть специалисту, работающему с переводом, полученным с помощью компьютера. Такой подход к использованию трансфера характерен не только для большинства работающих зарубежных алгоритмов [Liu et al., 2022], но и для отечественных систем МП.

Использование трансфера в реально действующих системах МП подтверждает целесообразность выбора этой стратегии. В то же время уровень развития систем искусственного интеллекта и новые возможности вычислительной техники определили новое пробуждение интереса к третьей стратегии МП – моделированию понимания с помощью языков-посредников.

Увязка *систем МП, реализованных на основе языка-посредника*, и систем искусственного интеллекта определяется необходимостью использовать в них сложные базы знаний, с помощью которых должно быть распознано значение предложения или содержание целого текста и автоматически сгенерирован его пересказ на выходном языке.

Моделирование концептуального уровня понимания, являющегося промежуточным уровнем систем искусственного интеллекта, основывается на нескольких базовых составляющих [Беляева, 2016]:

– языках представления знаний, требующих организации словарей в виде статей, включающих узлы-понятия и типы связей (свойства);

– системных грамматиках, осуществляющих преобразование по принципу «признак – значение».

Язык представления знаний, используемый в подобных системах, и является языком-посредником, осуществляющим семантическую «разметку» входного предложения относительно семантической сети и генерацию выходной фразы из этого внутреннего представления. Такая генерация реализуется по образцам (шаблонам, фреймам и т. п.). При всей общетеоретической привлекательности этого подхода он останется экспериментальным до тех пор, пока не будут созданы лингвистические основы и программные средства для построения мощных семантических

сетей и онтологий на основе автоматизированных лексиконов.

Практически до конца XX в. методы статистического (даже, точнее, количественного) анализа использовались при разработке систем МП на уровне пополнения словарей за счет актуальной терминологии. Расширение объемов оцифрованных текстов, доступных в сети Интернет, изменило подход к возможностям применения статистики. Особая роль в этом процессе принадлежит текстам параллельным, в которых одно и то же содержание представлено на нескольких языках благодаря переводу документов.

Наиболее часто используемыми параллельными текстами были протоколы заседаний или другие официальные документы стран с несколькими официальными языками (Канада, Швейцария, Гонконг и др.) и документы международных организаций. Одна из причин использования таких текстов при решении задач обработки данных на естественном языке заключается в том, что они открыты, их достаточно легко получить, у таких текстов, как правило, большой объем. Кроме того, предполагается, что требования точности заставляют переводчиков подобных материалов использовать корректные литературные переводы. Наличие такого рода материалов явилось стимулом для нового витка интереса к применению статистических методов и в решении задач МП, включая вероятностное моделирование, теорию информации и линейную алгебру.

Основой использования статистических методов является идея о том, что значение слова определяется распределением контекстов, в которых используются слова и более сложные выражения. *Системы статистического машинного перевода* (*Statistical Machine Translation – SMT*) доминировали на протяжении нескольких десятилетий там, где не было необходимости в жестко предметно-ориентированном переводе. Базой для их реализации стала разработка параллельных корпусов текстов, в которых данные выравнивались на уровне отдельных слов, словосочетаний и предложений. В основе процедуры перевода лежит количественная оценка выровненных сегментов в параллельном корпусе [Раренко, 2021].

Системы *нейронного машинного перевода* (далее – НМП) сегодня стали доминирующим инструментом в области МП, свидетельством чему является их включение в программные средства компаний Google, Microsoft, Яндекс, DeepL и др., которые ранее использовали статистический МП.

Нейронными сетями (далее – НС) называются структуры, которые способны имитировать процессы, моделирующие работу человеческого мозга. Важной особенностью нейронных сетей является способность к обучению, что обеспечивает их преимущество перед классическими алгоритмами, основанными на переборе вариантов.

У нейронных сетей есть несколько существенных преимуществ по сравнению с порождающими языковыми моделями на основе N-грамм. Архитектура таких сетей легко адаптируется для того, чтобы проецировать входные слова в представления меньшей размерности (например, измерения размером 500, где слова представлены в виде 500-позиционных векторов). Это позволяет автоматически группировать похожие слова во вложенном пространстве (*embedding space*). Представления слов в таком пространстве в настоящее время описываются как векторные представления слов (*word embeddings*). Более того, конкретные лексико-грамматические свойства слов кодируются в соответствии с размерами этих распределенных представлений [Popović, 2017].

Сегодня принято различать два основных вида нейронных сетей: рекуррентные (*recurrent neural networks* – RNN) и сверточные нейронные сети (*convolutional neural networks* – CNN). Для решения различных задач анализа текстов на естественном языке и распознавания звучащей речи используются рекуррентные нейронные сети. Сверточные нейронные сети хорошо справляются с такими задачами, как классификация изображений и предложений, а также сентимент-анализ. Особенностью рекуррентных сетей является возможность использовать предыдущие выходные данные в качестве входных, имея при этом скрытые состояния. Применение этих сетей обеспечивает поддержания модульной структуры системы, поскольку они поддерживают передачу параметров, что особенно важно для

анализа текста при МП. При этом размеры модели необязательно увеличиваются с увеличением объема ее входных данных. Обычно используемые варианты RNN включают два варианта архитектуры: двунаправленную (*bidirectional* – BRNN) и глубинную (*deep* – DRNN) [Lankford, Afli, Way, 2021, p. 49–50].

Предполагается, что в отличие от систем «перевода по правилам» системы нейронного перевода работают с текстом в целом, а не с отдельными предложениями. Это утверждение, к сожалению, не соответствует действительности: анализ переводов слов, не зарегистрированных в системе, демонстрирует несовпадение их переводов. Архитектура системы нейронного машинного перевода включает две рекуррентные нейронные сети, одна из которых ответственна за обработку входной текстовой последовательности, а другая – за формирование выходного текста-перевода [Нуриев, 2019]. Соответственно, в системах НМП есть два важных компонента: кодер и декодер, которые работают и с исходным текстом, и с текстом, порождаемым системой. Системы имеют механизмы машинного обучения, позволяющие развивать лингвистическое обеспечение по мере использования системы, основу этого обеспечения составляют словари.

Во всех традиционных алгоритмах МП трудно переоценить роль автоматического словаря, который всегда был базой для лексико-морфологического анализа обрабатываемого текста и основой для реализации алгоритмов парсинга. Автоматический словарь (далее – АС) являлся и остается ядерной частью системы МП, так как именно на основе заключенной в нем информации реализовалось все программное обеспечение лингвистических алгоритмов [Беляева, 2022].

При отборе лексики в словари систем МП ранее учитывался не только терминологический статус лексической единицы – слова или словосочетания (машинного оборота), но и ее распространенность в конкретном языке для специальных целей. Автоматические словари не являлись словарями нормативными, поскольку в качестве заглавия словарной статьи используются все встречающиеся варианты номинации объектов, а перевод соответствует рекомендуемому для конкретного

языка перевода и предметной области [Беляева, 2016]. Объем АС зависит от типа (уровня аналитизма) языка и реализованных в системе алгоритмов морфологического анализа. Эти алгоритмы определяют и способы хранения информации в АС, и саму структуру АС (включение в нее машинных основ, словоформ, фрагментов слов или единиц, больших, чем слово), и сами алгоритмы морфологического анализа. Эти алгоритмы морфологического анализа, детально разработанные для «традиционных» систем МП, используются и при нейронном МП, предполагая, в частности, процедуры морфологического анализа слов, в системе не зафиксированных, но имеющих в своем составе латинские или греческие префиксы, частотные суффиксы, устойчивое значение которых позволяет вычислять значение такого неопознанного слова как сумму значений префикса, суффикса и слова, уже зарегистрированного в базе лексических данных [Sennrich, Haddow, Birch, 2015].

Однако сами словари систем и статистического, и нейронного МП организованы иначе. Они создаются как электронные таблицы (*spreadsheets*), в которых выделяются строки, столбцы и отдельные ячейки. Ячейками в электронной таблице называются пространства, содержащие единицы информации. Каждая ячейка маркируется своим местом в таблице (например, A1, A2, A3, ...) и может иметь абсолютную или относительную отсылку к ячейкам, ее окружающим. Они могут хранить различную информацию, которая обрабатывается (извлекается, суммируется и т. д.) с помощью прикладных программ. Наполнение таких таблиц осуществляется по мере развития (машинного обучения) системы на материалах получаемых переводов. В электронные таблицы вводятся пары лексических единиц, извлекаемые из предметно-ориентированных и параллельных корпусов текстов. Основу элементов, включаемых в таблицы, составляют многокомпонентные словосочетания, являющиеся основным способом номинации элементов предметных областей. Поэтому такие таблицы принято называть таблицами словосочетаний (*phrase-table*).

В общем случае электронные таблицы предназначены для хранения количественных данных и коротких текстовых строк. Кроме того, они обеспечивают графическое представление отношений между данными. Электронные таблицы могут структурировать и маркировать элементы данных так же полно, как базы данных, и обычно не предполагают возможности обращаться к базе данных с запросами. Функции для работы с электронными таблицами предоставляют Google, Microsoft Excel, Lotus 1-2-3, VisiCalc.

Однако электронные таблицы не лишены недостатков. При обмене информацией между различными электронными таблицами они часто экспортируются как файлы, включающие значения, разделенные запятыми (*comma-separated value* – CSV). CSV является не единым форматом, а, скорее, дескриптором набора плохо определенных форматов, которые используют запятую, чтобы указать границы столбцов. Общая проблема обмена информацией между табличными представлениями состоит в том, что файлы в формате CSV могут быть в различных схемах кодирования и тип кодирования в файле не указывается, что делает их интерпретацию случайной. Microsoft Excel, возможно наиболее популярная программа работы с электронными таблицами, например, не может правильно загружать файлы в формате CSV, если они даны в коде UTF-8 (базовый формат для текстов, написанных на кириллице), и вместо этого требует кодировку ISO Latin-1, в результате чего для многих языков файлы CSV нельзя использовать в Excel.

Нейронные сети второго типа (CNN) работают с векторами слов и фильтрами, которые объединяют локальную информацию в рамках предложения. Чаще всего для получения наиболее эффективных результатов используется гибридный подход, предполагающий использование обоих видов сетей.

Для работы любой нейронной сети необходимо создание обучающих массивов данных. Процесс сбора и обработки данных делится на две различающихся процедуры: 1) сбор обучающих данных; 2) разработка и тестирование данных. Чаще всего для сбора данных, предназначенных для решения задач, связанных с обработкой текстов на естественных языках, используются уже существующие репрезентативные одноязычные или парал-

лельные корпусы текстов. Создание и предварительная разметка корпуса, ориентированного на новую с точки зрения предметной области или задач сферу, представляет собой чрезвычайно трудоемкую задачу. Поэтому при решении вопроса о возможности использовать нейронные сети в процессе обучения необходимо исследовать вопрос о наличии нейронных сетей, решающих требуемые задачи, и об их соответствии целям обучения [Peris, Casacuberta 2019].

Наибольшие улучшения были продемонстрированы, когда архитектура RNN или CNN была полностью отменена и заменена механизмом внимания, создающим гораздо более простую и быструю архитектуру, известную как Transformer [Devlin et al., 2019]. Модели трансформера фокусируются на ранее сгенерированных токенах. Такой подход позволяет моделям развивать длительную память, что особенно полезно в области перевода. Повышение производительности в CNN- и RNN-подходе может быть достигнуто за счет внедрения таких уровней в архитектуру перевода [Lankford, Afli, Way, 2021, p. 50]. В последние годы большие языковые модели на архитектуре трансформеров стали вершиной развития нейросетей в задачах обработки текстов на естественных языках.

Одной из мощнейших нейросетей, доступных в открытом доступе, является сеть ChatGPT, представляющая собой языковую модель, обученную OpenAI, которая использует глубинное обучение для генерации текста и ответов на вопросы. Эта модель была создана на основе технологии трансформеров, что позволяет обрабатывать большие объемы текста и понимать связи между словами и предложениями, для ее тренировки использовались методы обучения с учителем и с подкреплением.

На основе ChatGPT в 2021 г. была разработана модель YaLM. Нейросеть YaLM обучена на части индексируемых Яндексом страниц Рунета, включая не только Википедию, новостные статьи и книги, но и открытые записи пользователей социальных сетей и форумов. Чтобы не перегружать модель, из этого обучающего массива удаляются повторяющиеся, незаконченные и неестественные тексты, то есть данная сеть является

предварительно настроенной (*pre-trained*). Эта сеть обучалась 65 дней на 1,7 ТБ текстов из Интернета, книг и множества других источников с помощью 800 видеокарт A100. Нейросеть YaLM содержит 100 млрд параметров и является самой большой из существующих моделей для русского и английского языков. Это реально позволяет использовать ее для решения большого круга задач, связанных с обработкой естественного языка. Языковые модели из семейства YaLM определяют принцип построения текста и генерируют новые.

Постановка проблемы

В отличие от автоматического словаря первых (бинарных) систем МП, состоящего из словарных статей, словари современных систем МП, реализованные как электронные таблицы, расширяются автоматически. Однако опыт использования систем НМП (например, Google Translate и Yandex Translate) демонстрирует провал работы этих систем при обработке лексических единиц, не зарегистрированных в электронных таблицах либо из-за их терминологической специфики, либо из-за низкой частоты использования в массивах и корпусах текстов. Обработка таких неопознанных слов является сегодня одной из самых острых проблем активно используемого нейронного МП, поскольку нарушает восприятие текста и затрудняет редактирование результатов МП [Araabi, Monz, Niculae, 2022].

В задачи настоящей статьи, наряду с определением типологии систем МП и описанием изменений в формах и способах ведения их словарных баз под влиянием технологических причин, входит выявление ошибок и анализ их причин в обработке слов, не опознанных системами нейронного МП.

Материалы и методы

Для оценки результатов распознавания неопознанных слов был проведен эксперимент с переводом 451 фрагмента текстов научных статей, посвященных современным проблемам перевода (см. табл. 1), включающих существительное *translationese* [Toral, 2019], ко-

торое отсутствует не только в словарном обеспечении двух наиболее часто используемых систем НМП Google Translate и Yandex Translate, но и в англо-русских переводных словарях. Хотя формально в этом слове можно выделить суффикс прилагательного *-ese* со значением '*обладающий данным качеством*', формально сформировать значение существительного *translationese* как сумму значений *translation* и *-ese* невозможно. Аналогичный вариант наблюдается со словом *interpretese*, где сочетаются глагол *interpret* и суффикс *-ese*.

Методы работы с экспериментальным материалом включали автоматическое извлечение контекстов с существительным *translationese,* их машинный перевод, а также количественный, морфологический, синтаксический и сопоставительный анализ предлагаемых вариантов перевода.

Таблица 1. **Список использованных материалов с количественными характеристиками фрагментов со словом** *translationese*

Table 1. **List of materials used with quantitative characteristics of fragments with the word** *translationese*

Название статьи	Число фрагментов	Частота *translationese*
Baroni M., Bernardini S. A New Approach to the Study of Translationese: Machine-Learning the Difference Between Original and Translated Text // Literary and Linguistic Computing. 2005.	16	17
Toral A. Reassessing Claims of Human Parity and Super-Human Performance in Machine Translation at WMT 2019 // Proceedings of the 22nd Annual Conference of the European Association for Machine Translation, 3–5 November 2020. Online Conference. URL: https://aclanthology.org/2020.eamt-1.pdf	2	2
Toral A. Post-editese: an Exacerbated Translationese // Proceedings of Machine Translation Summit XVII, 2019. Vol. 1. Research Track. URL: https://www.mtsummit2019.com/workshops	8	9
Riley P., Caswell I., Freitag M., Grangier D. Translationese as a Language in "Multilingual" NMT. arXiv:1911.03823v1	52	58
Graham Y., Haddow B., Koehn P. Translationese in Machine Translation Evaluation. arXiv:1906.09833v1	14	15
Koppel M., Ordan N. Translationese and Its Dialects // Proceedings of the 49th Annual Meeting of the Association for Computational Linguistics, Portland, Oregon, June 19–24, 2011, pp. 1318–1326. URL: https://aclanthology.org/P11-1000	34	40
Towards the Classification of the Finnish Internet Parsebank: Detecting Translations and Informality // Nodalida 2015. Proceedings of the 20th Nordic Conference of Computational Linguistics. URL: https://aclanthology.org/W15-1800.pdf	1	1
Larkin S., Simard M., Knowles R. Like Chalk and Cheese? On the Effects of Translationese in MT Training // MT summit 2021. URL: https://cmt3.research.microsoft.com/MTSUMMIT2021	35	46
Wang J., Meng F., Zhang T., Liang Y., Xu J., Li Z., Zhou J. Understanding Translationese in Cross-Lingual Summarization. arXiv:2212.07220v1	82	92
Nikolaev D., Karidi T., Kenneth N., Mitnik V., Saeboe L., Abend O. Morphosyntactic Predictability of Translationese // Linguistics Vanguard. 2020. Vol. 6, № 1. P. 20190077. DOI: https://doi.org/10.1515/lingvan-2019-0077	9	11
Wein S., Schneider N. Translationese Reductionusing Abstract Meaning Representation. arXiv:2304.11501v1	75	94
Chen S. Effect of Translationese on Machine Translation Quality. URL: https://web.stanford.edu/class/archive/cs/cs224n/cs224n.1194/reports/custom/15721959.pdf	15	16
Edunov S., Ott M., Ranzato M.'A., Auli M. On the Evaluation of Machine Translation Systems Trained with Back-Translation // Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics, July 5–10, 2020. URL: https://aclanthology.org/2020.acl-main	38	40
He H., Daume H. III, Boyd-Graber J. Interpretese vs. Translationese: The Uniqueness of Human Strategies in Simultaneous Interpretation. URL: https://aclanthology.org/N16-1111	20	20
Итого	451	512

Результаты исследования

Проведенный анализ показал отсутствие предсказуемости в выборе перевода слова, которое не входит в лингвистическое обеспечение этих систем. Именно эта непредсказуемость затрудняет постредактирование переводов текстов, принадлежащих конкретной предметной области [Беляева, Камшилова, Шубина, 2023]. Всего в исследуемом массиве выделено 48 разных переводов слова *translationese*. Важно отметить, что методы транслитерации или транскрипции при передаче этого слова практически не используются. Единственным исключением является формирование гибридной формы *переводез*, зафиксированной в переводах системы Google Translate с частотой 2:

Translationese has originally been described... as the set of "fingerprints" that one language leaves on another when a text is translated between the two. →

Первоначально **переводез** был описан... как набор «отпечатков пальцев», которые один язык оставляет на другом, когда текст переводится с одного на другой.

Interference Effects in **Translationese** → Интерференционные эффекты в **переводезе**.

К особым переводам, формируемым этой же системой, относится форма *переводский (язык)*. Такого словотворчества в переводах, выполненных системой Yandex Translate, не зафиксировано.

Рассмотрим особенности перевода слова *translationese* в позициях, встречающихся чаще других (табл. 2).

В наибольшем числе выбранных системами эквивалентов выделяются различные словоформы лексемы *перевод* в характерных для нее словосочетаниях, фиксируемых табличными словарями системы автоматически, поскольку, как отмечалось выше, частотные словосочетания являются основой элементов,

Таблица 2. **Самые частотные переводы слова *translationese* в позиции ядра однокомпонентной именной группы**

Table 2. **The most frequent translations of the word *translationese* in the position of the core of a single-component nominal group**

№ п/п	Переводы	Частота в Yandex Translate	Частота в Google Translate	Суммарная частота перевода
1	Перевод	71	63	134
2	Переводческий язык	24	94	118
3	Translationese	34	7	41
4	Язык перевода	25	1	26
5	Переводы	12	4	16
6	Переводческий	7	8	15
7	Трансляционный язык	–	13	13
8	Переводческий (в конце)	7	4	11
9	Трансляция	7	4	11
10	Переводческие ошибки	8	–	8
11	Переводной	–	7	7
12	Трансляционный	1	6	7
13	Переводной язык	–	6	6
14	Переводческий диалект	–	4	4
15	Переводчик	–	4	4
16	Количество переводов	2	1	3
17	Переведенный текст	1	2	3
18	Перевод с английского	3	–	3
19	Переводной текст	–	3	3
20	Переводные тексты	3	–	3
21	Трансляции	–	3	3
22	Переводез	–	2	2
23	Переводные слова	2	–	2
24	Уровень перевода	1	1	2
25	Языки перевода	–	2	2

включаемых в словари такого типа (*переводческий язык, язык перевода, переводной язык, переводной текст* и т. д.). Кроме того, варьируются формы множественного и единственного числа, например: *перевод / переводы, переводной текст / переводные тексты, язык перевода / языки перевода*.

В традиционных системах МП было принято правило, при котором неизвестное системе слово подвергалось стандартному морфологическому анализу и при отсутствии частотных аффиксов оставалось непереведенным. В общем массиве примеров всего 57 демонстрируют отсутствие переводов, причем логика выбора именно этого варианта частично прослеживается в результатах. Так, в системе Google Translate устойчиво не переводится слово *translationese* в форме притяжательного падежа (частота 4) и в угловых скобках (частота 2).

Второй случай также характерен для системы Yandex Translate. Во всех остальных случаях установить причины, по которым слово осталось без перевода, не представляется возможным. Поэтому системы переводят это слово исходя из заложенных в них результатов формирования нейросетей. Соответственно, эти результаты требуют дополнительного и сложного редактирования.

Важно отметить, что часто разные системы используют переводы, которые не используются другой системой или используются при переводе других предложений. Так, например, только система Google Translate использует в качестве переводов следующие слова и словосочетания: *переводез, переводной, переводной диалект, переводной текст, переводной язык, переводоведение, переводский язык, переводческий диалект, переводческий стиль, переводческий характер, переводчик, переводчики, трансляции, трансляционизм, трансляционность, трансляционный сигнал, трансляционный стиль, трансляционный язык, языковой перевод, языки перевода*. В противоположность этому только система Yandex Translate использует в качестве перевода следующие единицы: *объем перевода, ошибки перевода, перевод на русский язык, переводные слова, переводные тексты, переводческие ошибки, переводческое мастерство, письменный перевод, сигналы трансляции, сложность перевода, точность перевода, переводческие тексты*.

Сопоставительный анализ результатов работы систем показывает, что в системе Yandex Translate предусмотрено дополнение перевода за счет вставки слов, расширяющих толкование. Так, в конструкциях с переходным глаголом со значением изменения при переводе системой Yandex Translate добавляется существительное со значением объема, однако выбор этого существительного оказывается произвольным. Например, появление в предложении глагола *reduce* с прямым объектом *translationese* приводит к вставке в результат МП существительных *сложность, объем, количество*, а перевод самого глагола *reduce* также варьируется в зависимости от выбранной модели преобразования синтаксической конструкции как *сокращение, уменьшить* (табл. 3).

Таблица 3. **Примеры расширенного перевода** *translationese* **в позиции прямого дополнения к** *reduce*

Table 3. **Examples of extended** *translationese* **translation in the position of direct object to** *reduce*

Текст на входе	Текст на выходе
As suggested by Freitag et al. (2020), diversified paraphrasing strategy might be a good solution to reduce the **translationese**	Как было предложено Фрейтагом и др. (2020), диверсифицированная стратегия перефразирования может быть хорошим решением для сокращения **сложности перевода**
Therefore, the post-editing strategy cannot reduce the **translationese**	Следовательно, стратегия постредактирования не может уменьшить **объем перевода**
In order to make the machine-translated documents or summaries suitable for evaluating model performance, some postprocessing strategies should be conducted to reduce the **translationese** in them	Для того чтобы документы или резюме, переведенные на машинный перевод, были пригодны для оценки производительности модели, следует использовать некоторые стратегии постобработки, чтобы уменьшить **количество переводов** в них

Иногда выбор такого дополнения определяется ядром словосочетания, в которое входит существительное *translationese*. Например, существительные *influence of* и *effect of* несмотря на один и тот же перевод на русский язык как *влияние*, явно имеют в системе МП разное описание типа воздействия (табл. 4).

Анализ результатов перевода слова *translationese* подтверждает, что при использовании систем НМП перевод слов, отсутствующих в словаре системы, произволен и должен особым образом проверяться и устанавливаться [Беляева, Камшилова, Шубина, 2023].

Заключение

Использование систем МП давно стало элементом профессиональной работы как специалистов в конкретных областях знаний, так и профессиональных переводчиков (см., например: [Khoong, Rodriguez, 2022]), при этом ни одна из предлагаемых сегодня систем не гарантирует профессионального качества продукта перевода без привлечения работы переводчика в качестве эксперта и редактора. Прикладная лингвистика прошла длинный путь от самой идеи машинного перевода к ее реализации в виде современных нейронных систем МП. Стратегии МП менялись под воздействием новых технологий разработки программного и лингвистического обеспечения, изменения самого парка компьютеров, характера доступности, способов обработки и хранения текстовых баз. При этом выбор конкретной стратегии МП – это всегда теоретическая и практическая задача, которая решается создателями конкретной системы МП. Однако при всех изменениях ядерной частью любой системы МП был и остается автоматический словарь.

Изменение форм ведения и способов пополнения словарной базы системы МП привело к тому, что словари наиболее востребованных и производительных нейронных систем перевода реализуются в виде автоматически пополняемых (и, соответственно, исключающих вмешательство переводчика-эксперта) таблиц и настроены на фиксацию частотных лексических единиц (слов и словосочетаний) в обрабатываемом массиве. При этом в словарную базу не попадают лексические единицы, претендующие на терминологический статус или характеризующиеся низкой частотой в обрабатываемых массивах или корпусах текстов.

Поскольку, вопреки декларируемым свойствам, нейронные системы МП работают не на уровне текста, а на уровне предложения (и, таким образом, не наследуют опыт перевода не опознанной словарем лексемы в пределах того же текста), интерпретация ими неизвестной лексики приводит к применению нескольких способов, обусловленных технологическими возможностями системы, ни один из которых не может считаться собственно переводом. Анализ работ систем Google Translate и Yandex Translate показал, что неопознанная лексема «переводится» следующими способами:

Таблица 4. **Примеры результатов перевода *translationese* в словосочетаниях *influence of* и *effect of***

Table 4. **Examples of *translationese* translation results in the phrases *influence of* and *effect of***

Текст на входе	Текст на выходе
Some researchers explore the influence of **translationese** on MT evaluation...	Некоторые исследователи исследуют влияние **языка перевода** на оценку МТ...
To control the effect of **translationese** on MT models, tagged training... is proposed to explicitly tell MT models if the given data is translated texts	Чтобы контролировать влияние **перевода** на модели МТ, предлагается обучение с тегами... чтобы явно указывать моделям МТ, являются ли данные переведенными текстами
...Mitigate the effect of **translationese** in cross-lingual transfer learning	...Смягчают влияние **перевода** при обучении межъязыковому переводу
In this paper, we investigate the influence of **translationese** on CLS	В этой статье мы исследуем влияние **языка перевода** на CLS
Subsequently, we can use the summaries in HT text and MT text as references, respectively, to train CLS models and analyze the influence of **translationese** on the model performance	Впоследствии мы можем использовать резюме в тексте НТ и тексте МТ в качестве ссылок, соответственно, для обучения моделей CLS и анализа влияния **перевода** на производительность модели

– формирование гибридной формы на основе комбинации опознанных частотных морфем – *переводез, переводский* (Google Translate);

– перевод близкой и более частотной лексемой или частотным словосочетанием с этой лексемой – *переводческий язык, язык перевода, переводной язык, переводной текст* (Google Translate, Yandex Translate);

– перевод словосочетаний с неопознанной лексемой с неоправданным расширяющим толкованием, обусловленным контекстом;

– без перевода.

При этом сопоставление результатов перевода двух систем позволило определить различные подходы к интерпретации лексем, отсутствующих в словаре системы, но не выявило существенных преимуществ: обе системы оставляют решение этой проблемы эксперту-переводчику. При этом главная проблема переводчика – распознавание ошибок в результатах системы МП, которые (кроме случая с гибридными формами) не демонстрируют внешних признаков некорректности.

Оптимальным решением этой проблемы представляется ведение пользовательского словаря, формируемого в виде традиционного набора словарных статей, включающих узлы-понятия и типы связей, а также фиксирующих переводы новой лексемы и ее контексты для обеспечения единства перевода в рамках текста или группы текстов.

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METAGRAPH THEORY
AS A BASIS FOR MODELING RELEVANT MEDIA DISCOURSE

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Abstract. This article is devoted to modeling media discourse based on a combination of a complex graph model and a multidimensional model. Despite significant advances in the field of neural network text processing, the task of modeling text and media discourse remains relevant. Large language models cannot be considered as a reliable discourse model, due to the fact that they are susceptible to hallucinations, which are features of model training and are difficult to diagnose and eliminate in practice. The basic model within the framework of the proposed approach is an annotated metagraph model; the main element of this model is the metavertex. The presence of metavertices with their own attributes and connections with other vertices corresponds to the principle of emergence, that is, giving the concept a new quality, the irreducibility of the concept to the sum of its component parts. Metagraph agents are used to transform metagraphs. A multidimensional metagraph model is a combination of a classical multidimensional model and an annotated metagraph model and allows complex descriptions in the form of metagraphs to be stored in hypercube cells. The multidimensional metagraph model can naturally be considered as a model of text and media discourse. The main drawback of the current version of the proposed model is the lack of a semantic discourse check system. Designing this system is the main direction for the development of further research.

Key words: media discourse, text processing, metagraph, metavertex, metaedge, metagraph agent, multidimensional metagraph model, hypercube.

ТЕОРИЯ МЕТАГРАФОВ
КАК ОСНОВА МОДЕЛИРОВАНИЯ АКТУАЛЬНОГО МЕДИАДИСКУРСА

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Аннотация. Статья посвящена моделированию медиадискурса на основе комбинации модели сложных графов и многомерной модели. Несмотря на значительные достижения в области нейросетевой обработки текста, задача моделирования текстов и медиадискурса остается актуальной. Сегодня большие языковые модели не могут рассматриваться как надежная модель дискурса по причине того, что они подвержены галлюцинациям, которые составляют особенности обучения модели и которые трудно диагностировать и устранить на практике. Базовой моделью в рамках предлагаемого подхода является аннотируемая метаграфовая модель, важнейшим элементом этой модели – метавершина. Метавершины со своими собственными атрибутами и связями с другими вершинами соответствует принципу эмерджентности. Для преобразования метаграфов используются метаграфовые агенты. Многомерная метаграфовая модель представляет собой комбинацией классической многомерной модели и аннотируемой метаграфовой модели и позволяет хранить в ячейках гиперкуба сложные описания в форме метаграфов. Многомерная метаграфовая модель может естественным образом применяться как модель текстового и медиадискурса. К значимым недостаткам текущей версии предложенной модели относится отсут-

ствие системы семантических проверок дискурса. Разработка системы таких проверок формирует отдельное направление дальнейших исследований.

Introduction

Since the term "modeling" has a fairly broad meaning, note that in this article, by modeling, we will understand the use of a data model that allows representing and analyzing a media discourse.

The task of developing a data model for the formalization of textual and media discourse has been considered for a long time. The most well-known solution in this area is Mann and Thompson's Rhetorical Structure Theory (RST) [Feng, 2023].

Currently, neural network solutions are mainly used for natural language processing, in which vector embeddings are used as a text representation model [Pilehvar, Camacho-Collados, 2020].

In particular, approaches such as word2vec and Glove are used to construct vectors of individual words, and the doc2vec approach is used to construct vectors of documents (text fragments) [Pilehvar, Camacho-Collados, 2020]. Explicit conversion of word vectors into text fragment vectors is not possible (this task requires building a separate model). Thus, the use of neural network models does not simplify the task of discourse modeling.

Currently, Large Language Models (LLM) are increasingly used for text analysis [Minaee et al., 2024]. At first glance, it may seem that the emergence of LLM models allows us to completely solve the problem of discourse modeling. The LLM model is capable of answering questions about the text, finding connections between text fragments and performing other complex actions on texts using the prompts mechanism (there is no need to go down to the level of vector embeddings). But the LLM model cannot be considered as a reliable discourse model, due to the fact that it is susceptible to hallucinations, which are features of model training and are difficult to diagnose and eliminate in practice [Yao et al., 2023].

Thus, despite significant advances in the field of neural network text processing, the task of modeling text and media discourse remains relevant.

In most of the previously proposed classical approaches, the task of modeling media discourse is reduced either to manipulating logical variables or to constructing a flat graph based on text fragments.

In this article the approach based on combination of a complex graph model and a multidimensional model is proposed.

The term "complex" in relation to graph models causes the greatest controversy. As a rule, the term "complex" is interpreted in two ways.

Option 1. Flat graphs (networks) of very large dimension. Such networks can include millions or more vertices. Edges connecting vertices can be undirected or directed. Sometimes a multigraph model is used, in which case two vertices can be connected not by one, but by several edges.

Option 2. Complex graphs that use a complex description of vertices, edges and/or their locations. Often in such models they abandon the flat arrangement of vertices and edges. It is these types of models that can be most useful when describing complex data models. Today, three version of complex graph models are known: hypergraph, hypernetwork, and metagraph. It is the metagraph model that is the most flexible and can be actively used for modeling complex subject areas, including in the humanities.

The core element of a metagraph model is a metavertex, which can include nested vertices, edges, and metavertices. The presence of metavertices with their own attributes and connections with other vertices is an important feature of metagraphs. This corresponds to the principle of emergence that is, giving the concept a new quality, the irreducibility of the concept to the sum of its component parts.

An extension of the metagraph model is a multidimensional metagraph model, which, using

an OLAP-like approach, allows storing not just numerical data in hypercube cells, but descriptions of complex situations in metagraph form and process situations when convolving hypercube fragments.

It is a multidimensional metagraph model that is used in this article for representation of discourse based on various media.

Materials and ьethods

In this section, we will briefly consider the basics of the metagraph model, the multidimensional metagraph model and their capabilities for modeling media discourse.

The metagraph model was initially proposed by A. Basu and R. Blanning in 2007 [Basu, Blanning, 2007], the model later received a number of extensions independently offered by various groups of researchers. Further in the article, by the metagraph model, we will understand the annotating metagraph model that is discussed in detail in [Gapanyuk, 2021].

The Brief Definition of the Annotating Metagraph Model. The metagraph may be described as follows: $MG = \langle V, MV, E, ME \rangle$, where MG – metagraph; V – set of metagraph vertices; MV – set of metagraph metavertices; E – set of metagraph edges; ME – set of metagraph metaedges.

Metagraph vertex is described by a set of attributes: $v_i = \{atr_k\}, v_i \in V$, where v_i – metagraph vertex; atr_k – attribute.

Metagraph edge is described by a set of attributes, the source, and destination vertices:

$e_i = \langle v_S, v_E, \{atr_k\} \rangle, e_i \in E$, where e_i – metagraph edge; v_S – source vertex (metavertex) of the edge; v_E – destination vertex (metavertex) of the edge; atr_k – attribute.

The metagraph fragment: $MG_i = \{ev_j\}$, $ev_j \in (V \cup E \cup MV \cup ME)$, where MG_i – metagraph fragment; ev_j – an element that belongs to the union of vertices, edges, metavertices, and metaedges of metagraph.

The metagraph metavertex: $mv_i = \langle \{atr_k\}, MG_j \rangle$, $mv_i \in MV$, where mv_i – metagraph metavertex belongs to a set of metagraph metavertices MV; atr_k – attribute, MG_j – metagraph fragment.

Thus, metavertex, in addition to the attributes, includes a fragment of the metagraph. The presence of private attributes and connections for metavertex is a distinguishing feature of the metagraph. It makes the definition of metagraph holonic – metavertex may include a number of lower-level elements and, in turn, may be included in a number of higher-level elements.

The proposed kind of metagraph model is called the annotating metagraph model because the same set of vertices and edges can be included in several different metavertices, which can represent different situations and can be annotated with different attributes. In other versions of the metagraph model, such metavertices were forcibly combined into single metavertex.

The example of metagraph is shown in Figure 1. The example contains three metavertices: $mv_1, mv_2,$ and mv_3. Metavertex mv_1 contains vertices v_1, v_2, v_3 and connecting them edges e_1, e_2, e_3.

Metavertices mv_2 and mv_2' contains vertices $v_4, v_5,$ and connecting them edge e_6. The identical
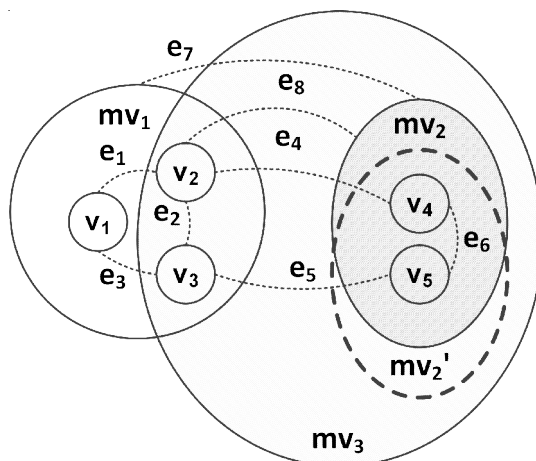
Fig. 1. The example of metagraph

contents of the metavertices mv_2 and mv_2' emphasize the annotating feature of the proposed model.

Edges e_4, e_5 are examples of edges connecting vertices v_2-v_4 and v_3-v_5 are contained in different metavertices mv_1 and mv_2.

Edge e_7 is an example of the edge connecting metavertices mv_1 and mv_2.

Edge e_8 is an example of the edge connecting vertex v_2 and metavertex mv_2. Metavertex mv_3 contains metavertices mv_2 and mv_2' vertices v_2, v_3, and edge e_2 from metavertex mv_1 and also edges e_4, e_5, e_8, showing the holonic nature of the metagraph structure.

Thus, in the metagraph model, a metavertex can contain both vertices and edges.

The vertices, edges, and metavertices are used for data description while the metaedges are used for process description. The metagraph metaedge: $me_i = \langle v_S, v_E, \{atr_k\}, MG_{ORD} \rangle$, $me_i \in ME, MG_{ORD} = \left\{ \overrightarrow{MG_j} \right\}$, where me_i – metagraph metaedge belongs to set of metagraph metaedges ME; v_S – source vertex (metavertex) of the metaedge; v_E – destination vertex (metavertex) of the metaedge; atr_k – attribute, MG_{ORD} – ordered set of metagraph fragments MG_j. Each metagraph fragment MG_j can also contain nested metaedges, which makes the description of the metaedge recursive.

The example of a metaedge me_1 is shown in Figure 2. The metaedge contains metavertices mv_S, ... mv_i, ... mv_E and connecting them edges. The source metavertex contains a nested metagraph fragment. During the transition to the destination metavertex, the nested metagraph

fragment became more complex, new vertices, edges, and inner metavertices may are added. In case of Figure 2 the source metagraph fragment is sequentially annotated with metavertices mv_2 and mv_2'.

The Brief Definition of the Metagraph Agents. In order to ensure the transformation of metagraphs, metagraph agents (ag^{MG}) are used. Basically two kinds of metagraph agents are proposed: the metagraph function agent (ag^F) and the metagraph rule agent (ag^R). Thus, $ag^{MG} = ag^F \mid ag^R$.

The metagraph function agent serves as a function with input and output parameters in the form of metagraph: $ag^F = \langle MG_{IN}, MG_{OUT}, AST \rangle$, where ag^F – metagraph function agent; MG_{IN} – input parameter metagraph; MG_{OUT} – output parameter metagraph; AST – abstract syntax tree of metagraph function agent in the form of metagraph.

The metagraph rule agent is rule-based: $ag^R = \langle MG, R, AG^{ST} \rangle, R = \{r_i\}, r_i : MG_j \rightarrow OP^{MG}$, where ag^R – metagraph rule agent; MG – working metagraph, a metagraph on the basis of which the rules of the agent are performed; R – set of rules r_i; AG^{ST} – start condition (either metagraph fragment for checking start rule, or start rule); MG_j – a metagraph fragment on the basis of which the rule is performed; OP^{MG} – set of actions performed on metagraph.

The antecedent of the rule is a condition over the metagraph fragment. The consequent of the rule is a set of actions performed on the metagraph.

Rules can be divided into open and closed.

The consequent of the open rule is not permitted to change the metagraph fragment
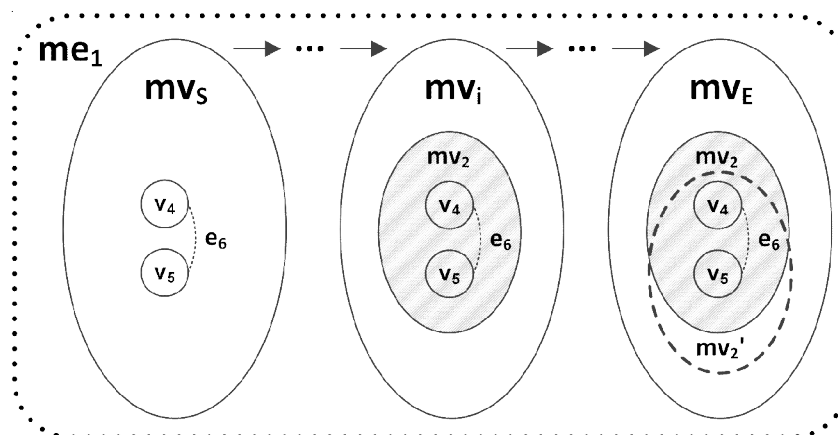
Fig. 2. The example of metaedge

occurring in the rule antecedent. In this case, the input and output metagraph fragments may be separated. The open rule is similar to the template that generates the output metagraph based on the input metagraph.

The consequent of the closed rule is permitted to change the metagraph fragment occurring in the rule antecedent. The metagraph fragment changing in rule consequent causes to trigger the antecedents of other rules bound to the same metagraph fragment. But incorrectly designed closed rules systems can cause an infinite loop of metagraph rule agents.

Thus, the metagraph rule agent can generate the output metagraph based on the input metagraph (using open rules) or can modify the single meta*graph (using closed rules)*.

The Brief Formalization of the Multidimensional Data Model. The classical multidimensional data model, proposed by Edgar F. Codd, allows working with numerical data (measures) binding them to the hierarchical taxonomies (dimensions) [Codd, 1993]. The multidimensional data model is a core for OLAP (online analytical processing) information systems.

In this section, we use our own simplified version of the formalization of multidimensional data model according to [Gapanyuk, 2019], which will help to describe multidimensional metagraph model, proposed in the next section.

Multidimensional hypercube may be described as follows: $HC = \langle MSR, HCD, HCF, HCR \rangle$, $MSR = \{ msr_i \}$, $HCD = \{ hcd_i \}$, $HCF = \{ hcf_i \}$, $HCR = \{ hcr_i \}$, where HC – hypercube; MSR – set of hypercube measures (msr_i – measure); HCD – set of hypercube dimensions (hcd_i – dimension); HCF – set of hypercube facts (hcf_i – fact); HCR – set of hypercube aggregation rules (hcr_i – rule).

In the case of the classical multidimensional data model, it is assumed that a measure can store only numerical values.

Hypercube dimension: $hcd_i = \langle \{ hcd_i^k \}, \prec \rangle$, where hcd_i^k – hypercube dimension element; $\prec$ – a partial order on the set of hypercube dimension elements. Partial order organization for dimension is more suitable than tree structure organization because partial order organization allows describing ragged hierarchies, in case of the time dimension, e.g. the "month → week → day" and "month → decade → day" hierarchies are allowed to exist simultaneously in one dimension.

Hypercube fact: $hcf_j = \langle \{ hcd_i^{ref} \}, \{ msr_n \} \rangle$, where hcd_i^{ref} – a reference to the dimension element; msr_n – measure. In the case of low-level hypercube fact, the set $\{ hcd_i^{ref} \}$ contains references to low-level elements of all hypercube dimensions. In the case of aggregated hypercube fact $\{ hcd_i^{ref} \} \in P(HCD)$, the set $\{ hcd_i^{ref} \}$ belongs to the powerset P of all hypercube dimensions because aggregation rules may exclude dimensions during the aggregation process. Simultaneously, during aggregation, elements hcd_i^{ref} roll up upon their hierarchies, providing data aggregation on higher levels of hierarchies.

Hypercube aggregation rule: $hcr_k : \{ hcf_{OUT} \} = agf \left(\{ hcf_{IN} \}, HCD^{ag} \right)$, $HCD^{ag} \subset HCD$, where hcf_{OUT} – output (aggregated) facts; agf – aggregation function; hcf_{IN} – input (non-aggregated) facts; HCD^{ag} – a subset of hypercube dimensions used in aggregation.

Aggregation rules allow calculating aggregated facts on the base of non-aggregated or low-level aggregated facts and hypercube dimensions. The typical aggregation functions are *count*, *sum*, *min*, *max*, and other numerical functions. Depending on the multidimensional system implementation, aggregation rules may be bound to the particular dimensions or the whole hypercube.

Today the multidimensional model is widely used. However, this model is oriented to numerical measures usage which may be considered as a significant limitation. Textual or object-oriented information is not considered for use as measures.

In [Gapanyuk, 2019] the multidimensional metagraph model is proposed which allows storing fragments of metagraphs in hypercube cells in order to overcome the limitations of the classical multidimensional model.

The Brief Formalization of the Multidimensional Metagraph Model. The formalization of the multidimensional metagraph model is based on the multidimensional data model formalization.

In this case the definition of a multidimensional metagraph hypercube remains the same: $HC_{MG} = \langle MSR, HCD, HCF, HCR \rangle$, but the elements of all sets included in the definition acquire a metagraph interpretation.

The measure is considered as a metagraph fragment: $msr_i \equiv MG_i$ where msr_i – measure; MG_j – metagraph fragment. This means that a hypercube cell can contain not only a numeric value but any complex data structure described by the metagraph.

The hypercube dimension: $hcd_i = \left\langle \left\{ hcd_i^k \right\}, \prec \right\rangle$, $hcd_i \in MV, hcd_i^k \in (V \cup MV)$, where hcd_i – hypercube dimension; hcd_i^k – hypercube dimension element; $\prec$ – a partial order on the set of hypercube dimension elements; MV – set of metagraph metavertices; V – set of metagraph vertices. The hypercube dimension may be represented in the form of a hierarchically organized metavertex. The hypercube dimension elements that correspond to leaves of the tree can be represented as vertices, while the elements of the higher levels as metavertices.

The hypercube fact: $hcf_j = \left\langle \left\{ hcd_i^{ref} \right\}, \left\{ msr_n \right\} \right\rangle$, $hcd_i^{ref} \equiv e_i, e_i \in E, msr_n \equiv MG_j$, where hcd_i^{ref} – reference to the dimension element; msr_n – measure; e_i – metagraph edge that belongs to the set of metagraph edges E; MG_j – metagraph fragment. The hypercube fact may be represented in form of metagraph. Measure is considered as a metagraph fragment. The reference to the dimension element may be represented as edge, connecting measure element and dimension element.

In the definition of the hypercube aggregation rule the metagraph agent (using open rules) is used in process of aggregation instead of aggregation function: $hcr_k : \left\{ hcf_{OUT} \right\} = = ag^{MG} \left(\left\{ hcf_{IN} \right\}, HCD^{ag} \right)$, $HCD^{ag} \subset HCD$, where hcf_{OUT} – output (aggregated) facts; ag^{MG} – the metagraph agent used for aggregation; hcf_{IN} – input (non-aggregated) facts; HCD^{ag} – the subset of hypercube dimensions used in aggregation.

The aggregation example is shown in Figure 3. There is a simple hypercube with two dimensions hcd_1 and hcd_2. The hypercube facts correspond to the hypercube dimension elements combinations hcd_1^{11}-hcd_2^{11}, hcd_1^{11}-hcd_2^{12}, hcd_1^{12}-hcd_2^{11}, hcd_1^{12}-hcd_2^{12} are lower-level hypercube facts. The combination hcd_1^1-hcd_2^1 corresponds to the aggregated hypercube fact. In the process of aggregation, not only quantitative characteristics change but also the metagraph structure of cells corresponding to the facts of the hypercube.

Since, according to the definition, a measure is considered as a metagraph fragment, it is possible to create metaedges that are based on several cells of a hypercube. As an example, metaedge me_1 (firstly presented in Figure 2) is shown in Figure 3 as a dotted arrow.

Thus, the proposed approach allows storing in hypercube facts and aggregate not only numerical values but any complex data structures. This allows formally working with extracted from texts knowledge graphs.

The Metagraph-based Model of Text and Media Discourse. Based on multidimensional metagraph model the model of text discourse may be considered as multidimensional metagraph hypercube HC_{MG}.

The only service axis in a multidimensional hypercube is the "narrative time axis" or "model time axis". The presence of this axis allows organizing the facts extracted from the text. Facts may or may not be linked to the real-time axis.

Example sentence: *First unpack the laptop, then plug it into an outlet, then press the power button on the laptop.*

This sentence contains three facts, ordered among themselves (using model time axis), but not linked to the real-time axis: unpacking the laptop, plugging it into an outlet, pressing the power button on the laptop.

An important issue is the construction of the axes of a multidimensional metagraph hypercube. The following three options can be offered for the construction of axes:

– "Axes construction 1". Axis elements can be dynamically extracted from the text during its parsing;

– "Axes construction 2". Pre-formed axes can be used that have been extracted from previously analyzed texts or created manually from thesauri;

– "Axes construction 3". Pre-formed axes can be used, which are updated during text parsing.

From the point of view of the metagraph model, the following elements can be considered as metavertices:

– a separate axis of the hypercube;

– a fact extracted from the text;

– a fact linked to the axis elements characterizing it.

Consider the following example of two text fragments.
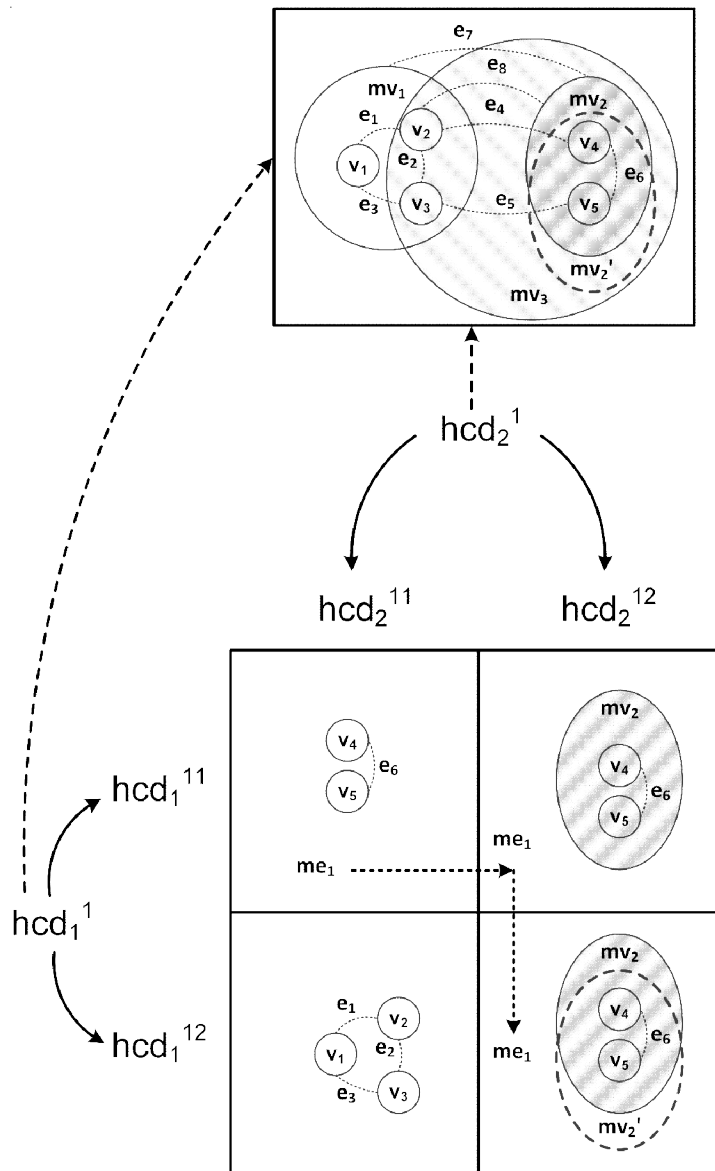
Fig. 3. The aggregation example

Text 1: *In the morning the worker was repairing the window, and in the afternoon, he was repairing the roof.*

Text 2: *From 10 to 12 am, a worker strengthened the window frame using a screwdriver and self-tapping screws. From 14 to 16 pm, a worker was strengthening the roof using self-tapping screws and an electric screwdriver.*

Both fragments consider a situation consisting of two facts: "a worker repairs a window", "a worker repairs a roof".

Using "Axes construction 1" approach we can extract the following axes from this text fragments:

Text 1:

1. Time axis: "morning", "afternoon".

2. Object axis: "window", "roof".

Text 2:

1. Time axis: "from 10 to 12 am", "from 14 to 16 pm".

2. Object axis: "window", "roof".

3. Tool axis: "screwdriver", "screws", "electric screwdriver".

Analyzing the axes of texts 1 and 2, we can draw the following conclusions:

1. The object axis in both fragments is presented identically.

2. The time axis in text 2 is considered in more detail than in text 1.

3. Only text 2 contains elements of an instrumental axis.

Note that from the point of view of the metagraph model, the element "from 10 to 12 am" can be represented as a metavertex containing nested vertices of the beginning and end of work.

In general, the proposed approach allows solving the following problems:

– If different sources are evaluated, it is possible to understand whether their meanings are comparable by comparing the coincidence of the axes. If the axes of text 1 are a subset of the axes of text 2, then text 2 contains a qualitatively more detailed description of situations compared to text 1.

– For models constructed within the framework of coinciding axes, the following comparisons are possible:

1. Comparison of generality/detail of descriptions (the most detailed descriptions correspond to leaf measurement concepts).

2. Comparison of the order of facts (events) using the time dimension.

3. Comparison of descriptions of the same situation obtained from different sources.

This approach can be used to analyze not only text discourse, but also media discourse. In this case, the multidimensional metagraph hypercube is extracted not from text, but from video (text captions can also be considered). The sequence of video frames naturally defines the "narrative time axis".

In this case, each frame can be considered as a metavertex, and a sequence of frames as a metaedge.

The Architecture of a Metagraph Based Media Discourse Analysis System. The proposed approach can be implemented in the form of a media discourse analysis system. The architecture of this system is shown in Figure 4.

The kernel of the system is the multidimensional metagraph model storage, that is used for storing elements of the multidimensional metagraph model: axes and facts.

The system contains three large modules:

1. The media parsing module.
2. The text generation module.
3. The metagraph modeling module.

The operation of the system consists of nine main steps (shown in Figure 4):
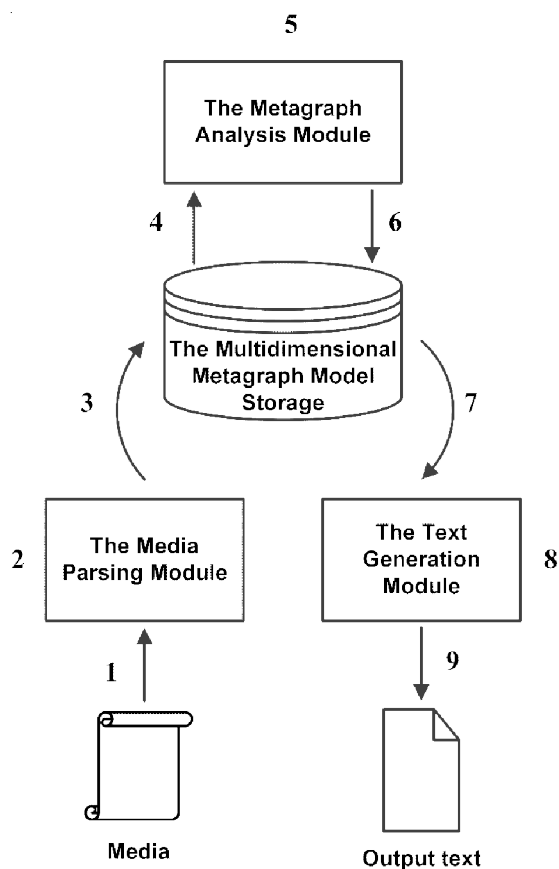
Fig. 4. The architecture of a metagraph based media discourse analysis system

1. The media files are being prepared for parsing.

2. The media files are parsed using deep learning methods. The elements of the multidimensional metagraph model are extracted.

3. The extracted facts and axes elements are recorded into multidimensional metagraph model storage.

4. The metagraph analysis module receives the data for analysis.

5. The analysis is performed. The source fragments of metagraph are annotated with new metavertices. The output fragments of metagraph are created.

6. The results of analysis are recorded into multidimensional metagraph model storage.

7. The text generation module receives the destination metagraph fragment from the multidimensional metagraph model storage.

8. The text generation module transforms destination metagraph fragment into text form.

9. The output text document is generated.

An important feature of the system is that texts and video fragments in various languages can be considered as input data. The extracted metagraph fragments are combined into a single model in the multidimensional metagraph model storage.

Discussion

Formal models of discourse analysis is a topic that has been increasingly attracting the attention of researchers. A modern review of works on this topic is given in [Feng, 2023].

In particular, in [Feng, 2023], an approach based on the construction of logical predicates is revised in order to establish a causal relationship between the events under consideration. But the predicate-based approach is poorly designed to compare different text fragments with each other.

Also, in [Feng, 2023] the Rhetorical Structure Theory (RST) and the Cross-document Structure Theory (SCT) are considered.

In [Liu et al., 2019] it is noted that the Mann and Thompson's Rhetorical Structure Theory (RST) "is one of the most influential theories of discourse, which posits a tree structure (called discourse tree or RS-tree) to represent a text." [Liu et al., 2019, p. 2].

In [Liu et al., 2019], the issues of automated RST discourse construction using neural networks are mainly considered, and a more detailed description of the RST model is given in [Hou, Zhang, Fei, 2020].

According to [Hou, Zhang, Fei, 2020] the minimal unit in RST approach is "Elementary Discourse Unit" (EDU) which is "functionally a simple sentence or a clause in a complex sentence." [Hou, Zhang, Fei, 2020, p. 2].

EDU are linked using Rhetorical Relation (RR) that "holds between two non-overlapping text spans and reflects how they link together to be a whole" [Hou, Zhang, Fei, 2020, p. 3]. The consistency of EDU linking is controlled by schemes (RST approach propose five kinds of schemes).

The Rhetorical Structure Tree (or RS-tree) is a "tree representation of a document under the framework of RST. The leaf nodes of an RS-tree are EDUs. Each internal node is characterized by a rhetorical relation and corresponds to a contiguous text span" [Hou, Zhang, Fei, 2020, p. 3].

From the point of view of the metagraph model, EDU may be represented as vertices and RR as edges. The RST model is based on flat graphs (tree graph model) and therefore, within the framework of this model it is impossible to describe such complex relationships as in the framework of the metagraph model. The consistency checking model (RTS schemes) may be implemented using metagraph agents.

The Cross-document Structure Theory (SCT) [Maziero, Jorge, Pardo, 2014] propose representing documents with levels: word level, phrase level, sentence/paragraph level, document level. Semantic links can be established between elements of all levels. The proposed hierarchy can be considered as an analogue of a set of nested metavertices. But the use of a multidimensional model is not proposed in this approach.

It is also necessary to mention such a project as Penn Discourse TreeBank (PDTB) which is now in version 3.0 [Webber et al., 2019]. This dataset contains about 53 thousand text fragments, as well as semantic links between them. The data model of this project is also flat graph, the disadvantages of which were already noted above.

Thus, in the reviewed sources, no approaches were found that, in order to

formalize discourse, would simultaneously use a graph model (especially based on complex graphs) and a multidimensional model.

It should also be noted that the multidimensional metagraph model has a distant analogue that is called "Graph OLAP" [Schuetz et al., 2021]. The main difference between the classical multidimensional model and the graph OLAP model is that instead of the hypercube aggregation operation, the graph aggregation operation is used [Khalil, Belaissaoui, 2022]. The Graph OLAP approach is an attempt to adapt the standard multidimensional model to graph data. This approach inherits the main problem of the classical multidimensional model. Unlike the multidimensional metagraph model, graph OLAP does not allow changing the type and structure of the data in the aggregation process, and therefore it is poorly suited for the discourse modelling.

Results

This article is based on a number of results obtained in the field of research of complex graphs, such as the annotating metagraph model, the metagraph agent approach, the multidimensional metagraph model.

The article shows that the multidimensional metagraph model can naturally be considered as a model of both text and media discourse.

At the same time, each analyzed media fragment should be simultaneously considered as both a metagraph of the situation representation and as a carrier of the set of axes elements of a multidimensional metagraph model. Axis elements can be dynamically extracted from the text during its parsing, or set of pre-formed axes can be used, or pre-formed axes can be updated during text parsing.

The proposed approach makes it possible to analyze and compare the discourses of several texts, while two fundamentally different cases can be distinguished: when the set of axes of a multidimensional metagraph model cube differs, and when it coincides. If the axes of text 1 are a subset of the axes of text 2, then text 2 contains a qualitatively more detailed description of situations compared to text 1. In case of coinciding axes, the following comparisons are possible: comparison of generality/detail of descriptions, comparison of the order of facts

using the time dimension, comparison of descriptions of the same situation obtained from different sources.

Based on the multidimensional metagraph model, the architecture of a metagraph based media discourse analysis system is proposed. The usage of multidimensional metagraph model allows mixing information in different languages, initially presented both in text form and in video form (possibly using subtitles).

Conclusion

Based on the multidimensional metagraph model, the proposed approach allows storing and analyzing discourse presented in different languages and in various media forms.

The main drawback of the current version of the proposed model is the lack of a system of semantic checks of discourse, similar to schemes in RST. The designing of a system of such checks is the main direction for the development of further research.

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ATTRIBUTION OF MEDIA TEXTS
BASED ON A TRAINED NATURAL LANGUAGE MODEL
AND LINGUISTIC ASSESSMENT OF IDENTIFICATION QUALITY [1]

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Abstract. The creation of effective systems for filtering media texts is due to the need to develop artificial intelligence systems, which is a large language model that should be trained using "correct" text samples that do not contain signs of disinformation, infodemic and unreliability. The article presents the results of automatic detection of high-quality media texts, as well as text samples with infodemic features carried out using a trained natural language model based on a manually labeled corpus. Manual marking of the corpus was carried out by experts based on the parameterization of the text content. The goal of our work is to build a model of the language of media messages, assess the quality and identify detection errors caused by the linguistic characteristics of texts. Creating a model of the language of media messages is a condition for increasing the efficiency and quality of artificial intelligence systems. It has been established that the test use of a trained natural language model allows filtering media texts with fairly high accuracy. The support vector machine method proved to be most effective. The share of incorrectly recognized informative texts that meet the criteria of reliability and novelty is low and amounts to 6.2 percent. The percentage of incorrectly recognized uninformative texts is approximately 3.9 percent, which indicates a fairly high efficiency of the developed model. The errors in the detection of informative texts are associated with the use of proper names (anthroponyms, toponyms) and numerals in the headings. Linguistic features of misclassified texts containing signs of fake and misinformation comprise text samples using statements with speech verbs that are often used in informative texts.

Key words: media text, neural network, language model, machine learning method, corpus, automatic detection.

АТРИБУЦИЯ МЕДИЙНЫХ ТЕКСТОВ
НА ОСНОВЕ ОБУЧЕННОЙ МОДЕЛИ ЕСТЕСТВЕННОГО ЯЗЫКА
И ЛИНГВИСТИЧЕСКАЯ ОЦЕНКА КАЧЕСТВА ИДЕНТИФИКАЦИИ [1]

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Аннотация. Разработка эффективных систем фильтрации медийных текстов обусловлена необходимостью развития систем искусственного интеллекта, представляющего собой большую модель языка, которая

должна создаваться на основе «правильных» текстовых образцов, не содержащих признаков дезинформации, инфодемии и недостоверности. В статье изложены результаты автоматической идентификации качественных медийных текстов и текстовых экземпляров, содержащих инфодемические и недостоверные признаки. Она проведена с применением модели естественного языка, построенной методами машинного обучения на основе размеченного вручную корпуса. Цели работы заключались в создании модели языка медийных сообщений, оценке ее качества и выявлении ошибок идентификации, обусловленных лингвистическими характеристиками текстов. Создание модели языка медийных сообщений выступает условием повышения эффективности и качества систем искусственного интеллекта. Установлено, что тестовое использование обученной модели естественного языка позволяет с высокой точностью провести фильтрацию медийных текстов. Наибольшую эффективность в рамках модели продемонстрировал метод опорных векторов: доля ошибочно распознанных информативных текстов, отвечающих признакам достоверности и новизны, невысока и составляет 6,2 %, количество неправильно распознанных неинформативных текстов составляет примерно 10,2 %. Установленные ошибки в идентификации информативных текстов связаны с употреблением в заголовках имен собственных (антропонимов, топонимов) и числительных. К лингвистическим признакам неправильно распознанных текстов, содержащих признаки дезинформации, относятся текстовые образцы, содержащие высказывания с глаголами в форме будущего времени, а также глаголами речи, часто встречающимися в достоверных текстах.

Ключевые слова: медийный текст, нейронная сеть, модель языка, метод машинного обучения, корпус, автоматическая идентификация.

Введение

Статья посвящена проблемам разработки модели языка медийных сообщений в целях фильтрации новостных текстов, находящихся в открытом доступе, в соответствии с критериями достоверности и информативности их содержания, а также лингвистической оценке эффективности разработанных алгоритмов. Актуальность проблематики обусловлена рядом обстоятельств:

– необходимостью разработки систем искусственного интеллекта (далее – ИИ), представляющего собой большую модель языка. Как отмечают ученые, основная цель исследований в области ИИ – «получение методов, моделей и программных средств, позволяющих искусственным устройствам реализовать целенаправленное поведение и разумные рассуждения» [Осипов, 2011, с. 9];

– понимание текстов машиной требует автоматического распознавания его интенциональной составляющей и определения объективных экстралингвистических и лингвистических маркеров, указывающих с высокой степенью вероятности на то, что мы имеем дело с ложной информацией [Николаева, 2019];

– широким распространением недостоверных текстов, основанных на мистифика-

циях [Распопова, Богдан, 2018], погоне за сенсациями [Иссерс, 2014] либо образующими деструктивные речевые практики, манипулирующие общественным сознанием и порождающими девиантное социальное поведение, внушающими тревожность и даже панику, образующими «информационный шум», затрудняющими информационный поиск.

Задачи автоматической идентификации текстов медийного дискурса представляют особую сложность, поскольку коммуникативная практика массово-информационного общения, к основным функциям которого относятся информирование и воздействие, предполагает не просто освещение социально значимых событий, но и фокусность представления информации, когда автор текста отбирает и интерпретирует их признаки, направленные на адаптивное информирование аудитории, осуществляет выбор языковых средств, придающих тексту информационную ценность, привлекающих и удерживающих внимание адресата (см., например: [Ильинова, 2018; Bednarek, Caple, 2017]).

В последнее время в медийном пространстве увеличивается количество текстов, обладающих признаками недостоверного содержания, и служащих средством манипуляции

общественным сознанием. В целях идентификации недостоверных текстов И.С. Карабулатова использует понятие «деструктема», трактуемое как «ключевая смысловая единица текста, которая определяется на основе заложенной в нем интенции разрушения и соответствующей ей цели воздействия, находящих выражение в языковой ткани текста» [Карабулатова, Копнина, 2023, с. 224]. Деструктивные тексты разнообразны, имеют различную природу, часто характеризуются пересекающимися признаками и с трудом поддаются классификации. К медийным текстам, образующим деструктивные медийные практики, исследователи относят инфодемические сообщения, фейковые тексты и тексты, использующие техники «кликбейтинга».

Возникновению термина *инфодемия*, образованного путем словосложения существительных *информация* и *эпидемия*, способствовала пандемия коронавируса. По наблюдению Ф.В. Борхсениуса, инфодемия «представляет собой стремительное и неконтролируемое распространение в новых медиа необоснованной и ложной информации о кризисных событиях, усиливающее общественное беспокойство» [Борхсениус, 2021]. В современном мире отмечается усиление инфодемии, которая оказывает влияние на все сферы жизнедеятельности человека и интерпретируется как новый вызов для общества [Кондратьева, Игнатова, 2023]. Как отмечают ученые, в процессе умышленного или, наоборот, непреднамеренного создания и распространения инфодемических нарративов ведущая роль отводится СМИ и соцмедиа [Землянский, 2021].

Рассматривая инфодемию как ключевой медиаконцепт современности О.Н. Кондратьева и Ю.С. Игнатова выделяют в его структуре исходный понятийный признак – «распространение недостоверной информации», который в массмедийном дискурсе получает максимальную конкретизацию, что выражается в появлении дополнительных, зачастую аксиологически нагруженных признаков» [Кондратьева, Игнатова, 2023]. Исследователи отмечают, что в инфодемических текстах информация квалифицируется как недостоверная, разнородная (смешение недостоверной и достоверной), избыточная и вредоносная; ее распространение характеризуется как преднамеренное, быстрое и массовое; основные

перлокутивные эффекты сводятся к вытеснению информации на другие темы, введению в заблуждение, недоверию официальным источникам, психологическому давлению на общество, панике.

Представленные в настоящее время в литературе определения инфодемического нарратива относят к числу его основных признаков дезинформацию как отправную точку и основную составляющую инфодемии [Землянский, 2021, с. 113]. Отмечается, что жанры инфодемических текстов различаются: это могут быть статьи или короткие рассказы от первого лица. Исходя из изученных материалов и опираясь на данные платформы по выявлению фейковых новостей First Draft, А.В. Землянский выделяет четыре группы инфодемических текстов: псевдомедицинские материалы, тексты-предупреждения, панические и конспирологические тексты, отмечая, что отдельные образцы могут сочетать признаки различных групп [Землянский, 2021].

Фейковые новости как лингвистический медиапродукт часто используют прием жанровой мистификации [Иссерс, 2014], что обычно осознается адресатом сообщения или соответствуют функциональным и структурно-семантическим особенностям «жесткой» новости, что затрудняет возможность их идентификации. К экстралингвистическим факторам возникновения ложной информации исследователи относят в том числе такие неинтенциональные факторы, как небрежность журналиста или его добросовестное заблуждение в отношении некоторых фактов [Суходолов, Бычкова, 2017]. Наиболее полная классификация текстовых маркеров фейковых текстов предложена учеными Воронежского университета, которые собрали и систематизировали разнообразные способы представления недостоверного содержания [Стернин, Шестернина, 2020]. Авторы выделяют виды фейков по степени искажения информации, по степени достоверности пространственно-временных характеристик, по степени достоверности и надежности источника информации, по цели создания и типу репрезентации [Стернин, Шестернина, 2020, с. 4–6]. Установленные лингвопрагматические маркеры фейковой новости дают возможность исследователю и рядовому читателю проводить дискурсивный и лингвостилистический анализ новостных сообщений и интерпретировать потен-

циально мистифицированные новости по шкале «ложь – правда» [Кошкарова, Бойко, 2020].

Разновидностью недостоверных медийных сообщений являются тексты, созданные с целью привлечения внимания читателя и увеличения количества переходов на сайт. Эти тексты строятся по модели информационного сообщения, но их содержание не соответствует содержащемуся в заголовке тезису (то есть используется технология кликбейтинга). Кликбейты также рассматриваются как средство фальсификации информации [Вольская, 2018; Чанышева, 2016; Al Asaad, Erascu, 2018; Shu et al., 2018]. Механизмы кликбейтинга неоднократно становились предметом лингвистического изучения. Например, Ж.Р. Сладкевич в качестве популярных механизмов подачи «кликабельного» контента называет такие, как подмена персонажей и ложная смерть, представление слухов под видом фактов, приемы семантической провокации, эвристические приемы, цитация и квазицитация, модификация контекста, преподнесение возможного как действительного [Сладкевич, 2019]. Перечень приведенных механизмов может быть расширен, поскольку они постоянно меняются.

Таким образом, текстовые сообщения не соответствующие основной цели медийного дискурса – информированию, достаточно разнородны, не имеют четко выраженных критериев выделения, имитируют достоверные сообщения, используя определенную структуру и языковые средства. Кроме того, приемы создания таких текстов постоянно модифицируются, отражая новые практики создания деструктивного контента. Соответственно, важной задачей исследователей, как отмечает И.С. Карабулатова, становится разработка параметрических моделей деструктивных текстов, что позволит в дальнейшем решить задачу поиска и идентификации деструктивной информации в разножанровых текстах автоматизированным путем [Карабулатова, Копнина, 2022].

Существуют различные подходы к автоматическому определению текстов, содержащих признаки дезинформации. Как отмечают Г.А. Некрасов и И.И. Романова, «статистическая обработка множества поддельных статей позволяет выделить наборы ключевых слов, которые с определенной долей вероятности сигнализируют о возможности, что статья является под-

дельной» [Некрасов, Романова, 2017, с. 129]. Основными методами решения задачи фильтрации некачественных текстов в недалеком прошлом выступали статистические, базирующиеся на вычислении различных частотных характеристик текста методы [Попов, Штельмах, 2019]. В последнее время для идентификации различных типов текстов и жанров используется метод машинного обучения. Автоматическое определение кликбейтинга на материале английского языка проведено в работах [Anand, Chakraborty, Park, 2017; Biyani, Tsioutsiouliklis, Blackmer, 2016; Kumar et al., 2018; и др.]; предложена гибридная техника категоризации кликбейтных и некликбейтных статей путем интеграции различных функций, структуры предложений и кластеризации, после чего к набору данных применяются модели машинного обучения для оценки алгоритмов машинного обучения [Pujahari, Sisodia, 2021]; создано расширение для браузера ClickBaitSecurity, основанное на алгоритме поиска легитимных и нелегитимных списков (LILS) и алгоритме проверки рейтинга домена (DRC) для более быстрого и эффективного обнаружения вредоносного контента [Razaque et al., 2022]; представлено определение фейковых сообщений на основе размеченного корпуса на английском языке в [Pérez-Rosas et al., 2018]; предложен метод выявления кликбейтных заголовков с использованием семантического анализа и методов машинного обучения: обосновано применение шести различных алгоритмов классификации машинного обучения (дерево решений, логистическая регрессия, наивный байесовский классификатор, машина опорных векторов, метод k-ближайшего соседа и дерево решений с градиентным усилением) как по отдельности, так и в совокупности [Bronakowski, Al-khassaweneh, Al Bataineh, 2023].

В русскоязычном научном поле сегодня представлены публикации, посвященные отдельным вопросам автоматизированного определения фейковых новостей с элементами искусственного интеллекта и машинного обучения [Жук Д. А., Жук Д. В., Третьяков, 2018, с. 23]. А.О. Третьяковым разрабатывается концепция метода автоматизированного определения фейковых новостей для русскоязычных текстов с элементами искусственного интеллекта и машинного обучения предложена в [Третьяков, 2018]. Автор делает вывод о большом потенциале, который можно извлечь

из применения искусственного интеллекта в связке с инструментарием по обработке веб-данных, вместе с тем разработанный метод идентификации фейковых сообщений направлен на решение задач автоматизации исполнения процессов в программном обеспечении и не в полной мере учитывает лингвистические характеристики текстов.

Цель нашего исследования – построение обученной модели естественного языка медийных сообщений и лингвистическая оценка эффективности автоматического распознавания информативных и недостоверных медийных сообщений на ее основе.

Материал исследования

Для обучения искусственной нейронной сети и экспериментального исследования предлагаемого метода использовался размеченный корпус, содержащий 1750 текстовых фрагментов, в которых воплощаются исследуемые типы медийных текстов. Корпус медийных сообщений включает тексты, размещенные на порталах lenta.ru, news.ru, tass.ru, aif.ru, kp.ru, kommersant.ru, vedomosti.ru и др. Общий объем корпуса составил 1 млн слов.

В общей сложности получилось две текстовых выборки по 875 текстов каждая. Первая выборка состоит из оригинальных новостных текстов, сообщающих о различных событиях и имеющих информативный характер. Большой массив содержащих достоверную информацию текстов, используемый для обучения системы их характеристикам, позволяет обеспечить высокую точность фильтрации. Ко второй группе мы относим все тексты, которые не содержат строго фактической информации, не соответствуют стандартам журналистской этики, а также те, что включают признаки недостоверных текстов, представленных ниже.

Лингвистическое обеспечение программ автоматического распознавания информативных и деструктивных медийных сообщений заключается в установлении в текстах языковых маркеров, по которым эксперты идентифицируют качество их содержательной составляющей. Для разработки модели языка медийных сообщений требуется размеченный вручную корпус, при создании которого необходимо прежде всего провести параметризацию текстового содер-

жания и описать показатели речевой системности в атрибуции его качества, которые в последствии будут предъявляться экспертам. Как отмечают исследователи, речевая (текстовая) системность выступает лингвистической базой компьютерного когнитивного моделирования [Салимовский и др., 2019]. В научной литературе описаны методы, используемые в системах автоматического распознавания интенций, основанных на идентификации эксплицитных языковых маркеров. Лингвистическое обеспечение программ автоматического распознавания коммуникативных действий заключается в систематизации маркирующих те или иные интенции разноуровневых языковых маркеров, по которым эксперты идентифицируют эти действия. Совокупность таких маркеров образует лингвистическую составляющую шаблонов, подлежащую дальнейшей программной формализации [Салимовский и др., 2021]. Вместе с тем интенция не всегда выражается на поверхностном уровне текста в эксплицитном виде и зачастую не соотносится с конкретными языковыми средствами ее воплощения, а скорее выражается комбинацией различных средств. В этом случае лингвистические признаки принадлежности текста к той или иной группе с трудом поддаются формализации и требуют выработки иных подходов к их автоматическому определению [Хижнякова, 2023].

Параметры недостоверных и содержащих признаки дезинформации текстов были выделены на основе систематизации имеющихся классификаций, а также анализе собственной коллекции текстов. Охарактеризуем установленные параметры.

Употребление собирательных существительных в сочетании с глаголами в форме будущего времени:

(1) Почти по 7 000 рублей: россияне получат специальную выплату перед самым Новым годом.

В дальнейшем содержании текста значение существительного конкретизируется за счет уточняющих признаков: *пенсионеры, которые пострадали в результате техногенных или радиационных катастроф*, отменяя таким образом пропозицию, вынесенную в заголовок.

Прием негативизации события, реализующийся в конструкции с использованием со-

бирательного существительного и отрицательной частицы *не* с личной формой глагола в будущем времени:

(2) Про деньги можно забыть: пенсионеры не получат пенсию в январе.

Основной текст сообщает о том, что пенсионные выплаты будут произведены раньше, в декабре.

Вырванные из контекста цитаты [Сладкевич, 2019], помещенные в другой контекст:

(3) «Не беспокоит»: Набиуллина заявила, что ЦБ не вернет деньги россиян с некоторых вкладов.

Взятая в кавычки фраза *«не беспокоит»* представляет собой частью ответа на вопрос главы Центробанка Эльвиры Набиуллиной, которая ответила, что ее «не беспокоит отток наличной валюты за границу в виде вкладов».

Сенсационные заявления с использованием слов, обладающих отрицательной оценочной семантикой:

(4) Грядет обнуление: для россиян, пользующихся картами Сбербанка, принято неожиданное решение;

(5) Хворь будет забирать жизни людей: что ждет человечество в 2023 году.

Использование глаголов речи *раскрывать*, *заговорить*, *заявить*, *назвать*, *пообещать*, *предрекать*, *раскрыть*, *признаться*, *заявить*, *ответить*, глагола *предсказать* или производного от него существительного *предсказание*, в сочетании с оценочными фразами:

(6) Каким будет мир в 2023 году: раскрыты жуткие записки Нострадамуса;

(7) Виктор Бут назвал самое тяжелое в американской тюрьме;

(8) Лечению не поддается: вот в какой зависимости признался Якубович.

Заголовок (6) содержит элементы мистификации: имя известного предсказателя в сочетании с отрицательно оценочной фразой, прогнозируя развитие событий по катастрофическому, деструктивному сценарию. В заголовке (7) использовано относительное прилагательное *американский*, которое заставляет читателя предположить, что в основном тексте речь пойдет об особенностях содержания в американской тюрьме, вместе с тем текст сообщает об отсутствии возможности общения с близкими людьми. Заголовок (8) содержит отрицательно оценочное существительное *зависимость* в сочетании с глаголом *признаваться*, что сигнализирует об отсылке к «новой искренности».

Употребление сниженной и жаргонной лексики:

(9) Онемеете: на замок Пугачевой нашелся покупатель.

Использование лексики, описывающей эмоциональную реакцию адресата сообщения на событие*:

(10) «Сбежала из больницы»: правда о поступке Степаненко вызовет слезы;

(11) «Трупные пятна»: Долина в жутком виде вызвала оторопь;

(12) Мать детей Киркорова вышла в свет! Все ахнули, узнав, что это всем известная…

Использование оценочной лексики:

(13) Ефремова больше нет: адвокат актера напугал страшным известием;

(14) Яна Чурикова: судьба Лены Терлеевой стала огромной трагедией для «Фабрики звезд-2».

Для распределения новостей по категориям применялся ручной отбор текстов и последующая сортировка на основании вышеописанных лингвистических признаков. Мы попросили экспертов выбрать ярлык «Недостоверный» или «Информационный», полагаясь на их собственное восприятие после прочтения новости. Два эксперта помечали новости в каждом наборе данных. В обоих случаях новостные статьи были представлены в случайном порядке, чтобы избежать предвзятости в их оценке. Эксперты разметили 875 и 875 новостей для наборов данных «Недостоверные новости» и «Информационные тексты», соответственно. Кроме того, мы оценивали эффективность автоматических классификаторов недостоверных новостей в сравнении со способностью человека их обнаруживать. Таким образом, мы сравниваем точность автоматической системы с точностью людей-экспертов.

Процессы решения задачи автоматизации идентификации информативных и неинформативных текстов на основе методов машинного обучения проводилось в два этапа.

Результатом первого этапа моделирования языка медийных сообщений стало векторное представление слов, которое является необходимым в задачах обработки естественных языков. Более того, использование численных методов сопряжено с использованием не просто числовым представлением слов, а с так называемым непрерывным представлением (подробно об этом см.: [Mikolov et al., 2013]). Современные методы искусственного интеллекта и машинного обучения выполняют обработку слов на основе их векторных представлений. Векторное представление слова – это сопоставление каждому слову некоторого набора чисел:

$$\text{автомобиль} \rightarrow (1.2, 3.4, 1.22, 0.17, ..., 6.75)$$

Количество чисел в векторе задает его размерность. Если сопоставить каждому слову словаря подобный вектор, получается вложение слов в векторное пространство. Такое вложение образует модель языка. Таких моделей можно составить неограниченное количество, поэтому к вложению слов накладывают некоторые условия, одним из которых выступает минимизация расстояний вложений семантически близких слов. Это, в частности, означает, что ближе всего к данному слову располагаются слова, сходные в смысловом отношении. Приведем один из способов векторизации слов на основе подсчета статистики употребления слов в тексте. Рассмотрим несколько текстов как документов $D_1, D_2, ..., D_N$. Для заданного слова w вычислим следующие величины:

$TF(w,D_i)$ = частота слова w в документе D_i,
$IDF(w) = \log(N /$ число документов, содержащих w).

Характеристика $TF\text{-}IDF(w,D_i)$ вычисляется так:

$$TF\text{-}IDF(w,D_i) = TF(w,D_i) \times IDF(w).$$

Таким образом, получаем вложения слов из коллекции документов в векторное пространство размерности N. Такое представление подходит для решения различных задач обработки естественного языка, в частности задачи кластеризации текстов или их классификации различными методами, например такими, как k ближайших соседей, метод Байеса, метод опорных векторов и т. п. Однако характеристика TF-IDF не подходит для решения других задач, где требуется выявление более точных семантических связей. Например, для построения генеративных моделей характеристика TF-IDF не используется. Кратко охарактеризуем алгоритм построения вложения слов, который был предложен в [Mikolov et al., 2013] и модифицирован в [Klyachin, Khizhnyakova, 2023]. Задача решается средствами машинного обучения. Это означает, что строится некоторое отображение

$$y = F(\theta, x),$$

в котором вектор x представляет собой вектор данных слов, а y представляет собой вектор предсказанных слов. При этом параметры и модели подбираются исходя из минимума ошибки предсказания:

$$E = |F(\theta, x_1) - y_1|^2 + ... + |F(\theta, x_M) - y_M|^2,$$
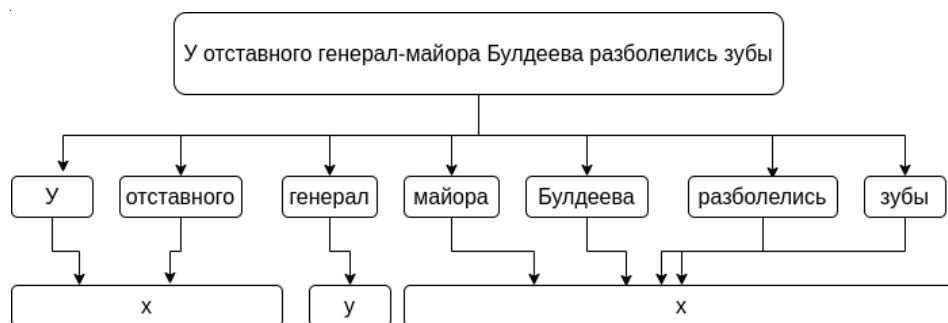
Рис. 1. Построение векторов из предложения

Fig. 1. A sentence converted to a vector

где M – число данных. Алгоритм обучения вложению не использует какой-либо специальной разметки текста, а слова, которые преобразуются в векторы x и y берутся непосредственно из текста. Это показано на рисунке 1.

Таким образом, модель $y = F(\theta, x)$ обучается предсказывать пропущенные слова в тексте – наиболее подходящие по смыслу.

Опишем теперь структуру $y = F(\theta, x)$ как нейросетевую модель. Она состоит из трех слоев (рис. 2).

Первый слой вложения – это именно тот слой, который вычисляет матрицу вложения. На схеме (рис. 2) n – это число слов в векторе x, который представлен так называемым унитарным кодированием слова из словаря, собранного из всех обрабатываемых текстов. Унитарное кодирование – это сопоставление слову из словаря вектора, в котором все значения равны 0, за исключением одной компоненты, равной единице, номер которой совпадает с номером слова в словаре. Далее, dim – размерность вложения. Этот параметр выбирается разработчиками. Второй слой – рекуррентный слой GRU, который анализирует последовательность слов, вырабатывая один вектор. В отличие от структуры нейронной сети, представленной в наших предыдущих работах (см.: [Klyachin, Khizhnyakova, 2023]), мы используем слой типа GRU, так как он добавляет нелинейность в обработке данных и, соответственно, улучшает аппроксимативные свойства модели. Третий слой – это плотный слой. Он предсказывает пропущенное слово, то есть имеет размерность, равную размеру словаря, вычисляя вероятности каждого слова. Далее используется принцип максимальной вероятности, и мы вырабатываем соответствующий вектор y.

Отметим, что похожие алгоритмы используются для обучения вложению на основе различных корпусов текстов на естественных языках. Например, имеется ресурс RusVectōrēs (https://rusvectores.org), на котором на странице https://rusvectores.org/ru/models/ в общий доступ выложены результаты обучения в виде моделей русского языка. В целом ресурс RusVectōrēs представляет собой инструмент, который позволяет исследовать отношения между словами в непрерывных моделях. Авторы сервиса называют собственный ресурс «семантическим калькулятором». Из тщательно подготовленных моделей, обученных на разных корпусах, пользователь может выбрать одну или несколько. Используя выбранную модель, можно выполнять в режиме онлайн следующие операции:

– вычислять семантическое сходство между парами слов;

– находить список слов, ближайших к заданному с дополнительной возможностью фильтрации по части речи и частотности;

– решать аналогии вида «найти слово X, которое так относится к слову Y, как слово A относится к слову B»;

– выполнять над векторами слов алгебраические операции – сложение, вычитание, поиск геометрического центра лексического кластера и вычислять расстояния до этого центра;

– рисовать семантические карты отношений между словами для визуального анализа семантических кластеров.

Приведем неполный список семантических связей, которые сохраняются моделями, представленными на этом ресурсе:

– связь глагол → существительное (например: *летать → самолет ⇒ плыть → корабль*);

– обобщение (например: *красный → цвет ⇒ собака → животное*);

– часть → целое (например: *колесо → машина ⇒ палец → рука*);

– степени прилагательных (например: *сильный → сильнейший ⇒ близкий → ближайший*).
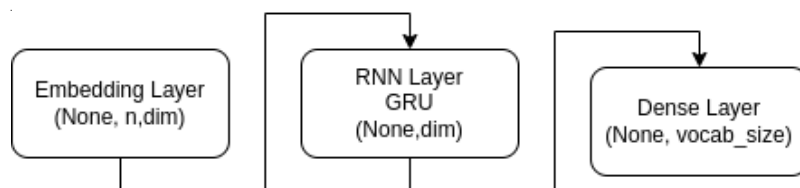
Рис. 2. Структура нейросетевой модели для обучения вложению

Fig. 2. The structure of the neuromodel for embedment learning

При этом связи типа

$$a \to b \Rightarrow c \to d$$

могут быть вычислены по формуле

$$d = c + (b - a),$$

предполагая, что ищутся слова, ближайшие к вектору *d*.

У описываемого сервиса есть API (Application Programming Interface), с помощью которого можно для любого слова получить список семантически близких к нему слов, указав модель языка. Результат можно получить в двух форматах: json и csv. Для этого необходимо выполнить GET-запрос по адресу следующего вида: *https://rusvectores.org/MODEL/WORD/ api/FORMAT/*, где MODEL – идентификатор для выбранной модели (берутся из таблицы на странице https://rusvectores.org/ru/models/), WORD – слово запроса, FORMAT – «csv» или «json» устанавливается по выбору. В результате запроса сервис возвращает файл в соответствующем формате, в котором перечислены ближайшие десять соседей слова. Кроме того, использовав формат запроса *https:// rusvectores.org/MODEL/WORD1__WORD2/ api/similarity/*, можно получать значения семантической близости для пар слов в любой из моделей.

Для решения задачи выявления неинформативных текстов мы использовали специально настроенную модель русского языка. Опишем процедуру создания такой модели. Подготовленные файлы, содержащие тексты (как информативные, так и нет) размещаются в отдельном каталоге. Алгоритм последовательно выполняет следующие этапы:

1) с использованием библиотеки NLTK проводится токенизация каждого текста и удаляются стоп слова. При этом сохраняются разделители предложений. На основе слов, содержащихся в текстах, строится словарь;

2) выбирается необходимое количество предложений текста и для каждого слова строится его унитарное представление *y*, а остальные слова размещаются в векторе *x* – в соответствии со схемой на с рисунке 1. Таким образом получаются матрицы *X* и *Y* размером, соответственно

$$M \times vocab\_size \cdot window\_size$$

и

$$M \times vocab\_size,$$

где *window_size* – число слов в векторе *x*;

3) процесс обучения нейронной сети, структура которой изображена на рисунке 2, проводился на двух датасетах. Необходимо отметить, что компьютерное моделирование нейронной сети осуществляется на основе библиотек Keras и Tensorflow на языке программирования Python 3.5. При этом параметры Датасета 1 вычислялись по корпусу *vocab_size* = 7 560 (количество уникальных слов); а также выбирались разработчиками следующим образом: *window_size* = 6; *dim* = 144; *M* = 19 033 (количество слов корпуса 39 082). Количество эпох обучения = 16 000. Обучение заняло 53 часа 20 минут. Параметры компьютера: Intel® Core™ i7-3770K CPU @ 3.50GHz × 8, операционная система ROSA Linux Server Edition, ядро Linux 3.10.0-514.44.1.el7.x86_64 x86_64, ОЗУ 16 Гб.

В результате обучения нейронной сети на материале Датасета 1 был получен файл, состоящий из 7 560 строк, каждая из которых содержит в начале слово из словаря и вычисленные нейронной сетью 144 координаты вложения этого слова.

Для Датасета 2 эксперимент был проведен со следующими данными: *vocab_size* = 14 468 (количество уникальных слов, увеличено по сравнению с первым датасетом в два раза); выбранные параметры были следующие: *window_size* = 6; *dim* = 144; *M* = 19 033 (количество слов корпуса 54 100). Количество эпох обучения = 16 000. Обучение заняло 222 часа 10 минут. Параметры компьютера: Intel® Core™ i7-3770K CPU @ 3.50GHz × 8, операционная система ROSA Linux Server Edition, ядро Linux 3.10.0-514.44.1.el7.x86_64 x86_64, ОЗУ 16 Гб.

В результате обучения нейронной сети на материале Датасета 2 был получен файл, состоящий из 15 560 120 строк, каждая из которых содержит в начале слово из словаря и вычисленные нейронной сетью 144 координаты вложения этого слова.

Полученная модель языка позволяет определить, является ли текст информативным или в нем содержатся признаки дезинформации, недостоверных сведений или инфодемические признаки.

Далее решались задачи автоматической идентификации недостоверных текстов. На этом этапе применялись стандартные методы машинного обучения, такие как байесовский классификатор и метод ближайших соседей для идентификации неинформативного текста. Для применения этих методов использовалась модель, обученная на Датасетах 1 и 2. Все тексты преобразовывались в векторы на основе соответствующих вычисленных коэффициентов матрицы линейного преобразования.

Результаты проведенных экспериментов приведены в таблице 1.

Как следует из таблицы 1, наилучшего качества классификации удалось с помощью линейного метода опорных векторов (SVM). При этом точность распознавания повышается с увеличением объема словаря, о чем свидетельствуют данные эксперимента, полученные для Датасета 2.

Результаты и обсуждение

Рассмотрим ошибки автоматического распознавания достоверных / недостоверных текстов, которые были выявлены в результате фильтрации, проведенной с использованием обученной модели естественного языка. В таблице 2 приводятся примеры текстов, которые были ошибочно идентифицированы как содержащие признаки дезинформации с указанием типа ошибки и ее доли в общем количестве неправильно распознанных текстов.

Как показывают результаты анализа, наибольшее количество ошибок в группе информативных текстов связано с использованием класса имен собственных, в частности антропонимов, называющих государственных деятелей, известных спортсменов, артистов эстрады и кино, журналистов и телеведущих и т. д., например: *Долина*, *Назарбаев*, *Милохин*, *Ланская* и др.; топонимов, называющих страны, города и другие географические объекты, например: *Москва*, *Рязань*, *Свердловск*, *Турция*, *Россия* и др. К отличительным признакам ошибочно классифицированных информативных текстов относится использование числительных (не только в основном тексте, но и в заголовках), например: *Правительство выделит более 9 млрд*

Таблица 1. **Результаты автоматической идентификации медийных текстов с применением методов машинного обучения, %**

Table 1. **The results of media texts automatic detection by machine learning methods, %**

Классификатор	Точность предсказания	
	Датасет 1	Датасет 2
Наивный байесовский классификатор	74,63	77,93
Метод ближайших соседей	74,87	77,35
Дерево решений	73,82	74,59
Случайный лес	80,37	80,30
Метод опорных векторов	81,22	83,50

Таблица 2. **Оценка качества выявления исследуемых информативных текстов на основе обученной модели языка**

Table 2. **Quality assessment of informative texts detection based on the learned language model**

Языковые маркеры	Примеры заголовков	%
Имена собственные (антропонимы) в сочетании с глаголами прошедшего времени	Экс-первая ракетка мира Навратилова победила рак груди и горла. Оксану Самойлову экстренно госпитализировали со странными симптомами. Блогер Александр Черкасов разобрал 1,8-литровый мотор ВАЗ-21179 от LADA Vesta и XRay	62,5
Имена собственные (антропонимы и топонимы)	Бедствующий в Дубае Даня Милохин в три раза снизил гонорар за концерт – теперь ему достаточно миллиона. Андрей Бурковский из США: переехал на ПМЖ или просто гостит уже 2 месяца?	18,75
Числительные	Почти 70 % россиян не хватает 5 тысяч рублей до зарплаты	18,75

рублей на строительство спортплощадок в регионах России.

В таблице 3 приведены примеры неинформативных текстов, ошибочно отмеченных машиной как информативные, доля которых составляет 16,5 %. Результат проверки качества автоматической оценки показал, что экспертная оценка текстов была проведена ошибочно в 6,3 % случаев, что свидетельствует о высокой точности модели. Доля нераспознанных деструктивных текстов составляет 10,2 %. Примеры текстов, которые были ошибочно идентифицированы как содержащие признаки информативности с указанием типа ошибки и ее доли в общем количестве неправильно распознанных текстов, представлены в таблице 3.

Как показывают результаты анализа, большая часть неправильно распознанных текстов, обладающих признаками недостоверности, содержат глаголы в будущем времени и отрицательно оценочную лексику. В меньшей степени представлены глаголы речи, такие как *раскрывать, заговорить, заявить, назвать, пообещать, предрекать, раскрыть, заявить, ответить*, что объясняется их широким использованием в информативных текстах; языковые средства, обозначающие ретроспекцию, то есть отсылку к произошедшему событию (глагол *случаться* в форме прошедшего времени). Выделенные языковые средства используются в следующих категориях недостоверных текстов:

– текстах, прогнозирующих развития событий по катастрофическому, деструктивному сценарию;

– текстах, содержащих конспирологическую аргументацию (ссылка на некий заговор, тайный глобальный план).

Выводы

Изучение текстов медийных сообщений как носителей объективного, достоверного знания или содержащего признаки инфодемии, ложной информации, отражающие деструктивные практики медийного дискурса, определяет значимость данного объекта для формального описания этих процессов средствами ИИ. Одним из прикладных аспектов этой проблематики является автоматическое распознавание информационной ценности текста посредством идентификации сообщений, содержащих признаки недостоверности и дезинформации, означающее, по сути, «понимание» машиной смысла высказывания. Опираясь на положение о системности медийной речи, детерминированной культурно и социально обусловленными целеустановками в структуре процессов информирования и воздействия, мы ставили цель – построить модель языка медийных сообщений и оценить эффективность алгоритма фильтрации текстов, содержащих инфодемические признаки.

Автоматический анализ текстов на основе обученной модели естественного языка продемонстрировал хорошее качество идентификации информативных и неинформативных текстов. Высокого качества классификации удалось добиться с помощью линейного метода опорных векторов (SVM).

Лингвистический анализ оценки эффективности идентификации текста, содержаще-

Таблица 3. **Оценка качества выявления исследуемых недостоверных текстов на основе обученной модели языка**

Table 3. **Quality assessment of non-informative texts detection based on the learned language model**

Языковые маркеры	Примеры заголовков	%
Глаголы, обозначающие коммуникативные действия	«Затронет весь мир»: экстрасенс заявила о грядущих авиакатастрофах	15,7
Глаголы в будущем времени	Каким будет мир в 2023 году: раскрыты жуткие записки Нострадамуса. Россия кончит плохо в апреле 2023. Страшное предсказание Глобы	31,4
Лексика отрицательной оценочной семантики	Час назад пришла трагическая весть об Мишустине: слезы по всей РФ. Крест на карьере: как Соловьев отмоется от такого позора	47,1
Другие	«ДАВНО УМЕР И ПОХОРОНИЛИ»: ЧТО СЛУЧИЛОСЬ С ПОПАВШИМ В БОЛЬНИЦУ НАЗАРБАЕВЫМ	5,8

го признаки недостоверности и дезинформации, показал, что в области автоматического распознавания интенции имеются определенные успехи, но необходимо совершенствование имеющихся алгоритмов. Перспективы дальнейшего исследования видятся нам в разработке датасета языка медийных сообщений на русском языке и повышении эффективности алгоритмов автоматической фильтрации медийных сообщений.

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EXPLORING AUTOMATED SUMMARIZATION: FROM EXTRACTION TO ABSTRACTION

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Abstract. This paper provides a review of AI-powered automated summarization models, with a focus on two principal approaches: extractive and abstractive. The study aims to evaluate the capabilities of these models in generating concise yet meaningful summaries and analyze their lexical proficiency and linguistic fluidity. The compression rates are assessed using quantitative metrics such as page, word, and character counts, while language fluency is described in terms of ability to manipulate grammar and lexical patterns without compromising meaning and content. The study draws on a selection of scientific publications across various disciplines, testing the functionality and output quality of automated summarization tools such as Summate.it, WordTune, SciSummary, Scholarcy, and OpenAI ChatGPT-4. The findings reveal that the selected models employ a hybrid strategy, integrating both extractive and abstractive techniques. Summaries produced by these tools exhibited varying degrees of completeness and accuracy, with page compression rates ranging from 50 to 95%, and character count reductions reaching up to 98%. Qualitative evaluation indicated that while the models generally captured the main ideas of the source texts, some summaries suffered from oversimplification or misplaced emphasis. Despite these limitations, automated summarization models exhibit significant potential as effective tools for both text compression and content generation, highlighting the need for continued research, particularly from the perspective of linguistic analysis. Summaries generated by AI models offer new opportunities for analyzing machine-generated language and provide valuable data for studying how algorithms process, condense, and restructure human language.

Key words: automated summarization, extractive summarization, abstractive summarization, artificial intelligence, neural networks, interdisciplinary research.

АВТОМАТИЗИРОВАННОЕ РЕЗЮМИРОВАНИЕ: ОТ МЕТОДОВ ИЗВЛЕЧЕНИЯ К АБСТРАКТНОМУ ОБОБЩЕНИЮ

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Аннотация. В статье представлен обзор моделей автоматизированного резюмирования текста, основанных на технологиях искусственного интеллекта и использующих два основных подхода: экстрактивный (извлекающий) и абстрактивный (обобщающий). Цель исследования заключается в оценке компрессионных возможностей этих моделей и их языковой компетентности. Степень сжатия оценивается при помощи количественных показателей: количество страниц, слов и символов. Для оценки языковой компетентности принимается во внимание способность моделей применять разнообразные грамматические и лексические конструкции без искажения смысла и содержания. Для оценки потенциала автоматизированного резюмирования были выбраны модели OpenAI Summate.it, WordTune, SciSummary, Scholarcy и OpenAI ChatGPT-4, материалом для анализа послужили тексты публикаций по разным научным дисциплинам. Результаты позволили установить, что выбранные модели с опорой на гибридную стратегию интегрируют как экстрактивные, так

и абстрактивные технологии. Тексты, созданные этими инструментами, варьировались по степени полноты и точности, при этом степень сжатия страниц составила от 50 до 95 %, а сокращение количества символов достигло 98 %. Качественная оценка показала, что, хотя модели в целом обладают способностью точно передавать основные идеи исходных текстов, некоторые резюме отличаются излишним упрощением или неверными смысловыми акцентами. Несмотря на эти ограничения, модели автоматического резюмирования обладают значительным потенциалом не только как инструменты для сжатия текста, но и как генераторы нового контента, который может стать ценным объектом для лингвистического анализа, способствуя изучению процессов машинного порождения языка и смысловой переработки текстов.

Ключевые слова: автоматизированное резюмирование, экстрактивное резюмирование, абстрактивное резюмирование, искусственный интеллект, нейронные сети, междисциплинарные исследования.

Introduction

The rise of digital technologies and expansion of internet resources has led to information overload [Bawden, Robinson, 2020], posing certain challenges for researchers in managing vast data, identifying reliable information sources and making decisions [Vertinova et al., 2022]. Automated text summarization, a key technique in Natural Language Processing (NLP), addresses this issue by condensing large texts into concise, essential content helping researchers quickly assess the relevance of publications [Sorokina, 2024].

Furthermore, by focusing on key ideas and eliminating redundancies, summarization simplifies information management and improves the absorption of scientific content, ensuring critical details are retained [Sorokina, 2023].

This paper aims to review AI-driven summarization models and technologies and evaluate their effectiveness in generating concise texts without losing essential content. Summaries and source texts are compared using quantitative and qualitative measures, focusing on scientific publications due to their complexity and technical nature [Sorokina, 2016]. Summarizers must be sensitive to details and capable of discerning core information from peripheral content. Furthermore, the unique structure of scientific texts further challenges the extraction process [Sorokina, 2016]. The texts produced through the summarization process also offer valuable insights for linguistic analysis, emphasizing the need for consistency and relevance in summarization.

Overview of the main paradigms of automated summarization

A review of the current literature shows that automated text summarization can be categorized on the basis of various approaches. Depending on the number of source texts involved there is single-document summarization, which focuses on condensing a single document [Lamsiyah et al., 2020], and multi-text summarization, which aims to distill key information from a collection of documents related by common themes [Thaiprayoon, Unger, Kubek, 2021; Khan, Salim, Jaya Kumar, 2015]. Besides, summarization processes yield two primary types of summaries: extractive and abstractive.

Extractive summarization

Extractive summarization condenses a text by selecting key sentences or phrases directly from the original content without altering them significantly [Bhargava, Sharma, 2020; Collins, Augenstein, Riedel, 2017]. This method preserves the text's original style and meaning using algorithms to evaluate sentence importance based on factors like sentence length, word frequency, and keywords related to the title or main topic.

Other important markers include proper names, named entities like organizational or geographical names, toponyms reflecting basic concepts of reality, and unique terms that are essential for understanding the text content. Additionally, importance markers, linking words, i.e. phrases like *consequently*, *in conclusion*, *as a result*, *furthermore* and *thus* indicate the

sentences containing key ideas or conclusions. Text formatting features such as italics, bolding, or underlining are also considered, as they can denote emphasis or key ideas. The length of sentences is another factor in assessing importance; longer sentences are often seen as more informative.

Abstractive summarization

Abstractive summarization represents a more complex aspect of natural language processing. Unlike extractive summarization, where phrases are pulled directly from the text, abstractive summarization generates entirely new content that maintains semantic consistency and syntactic coherence with the original text [Arana-Catania et al., 2021; Gupta S., Gupt S.K., 2019]. This process involves advanced neural networks that can retain key terms, the grammatical case, and the emotional neutrality typical of scientific texts while also creating novel sentence constructions not found in the original material.

Technological framework

The technological framework for automated summarization includes a variety of algorithms that are described here in simplified, non-mathematical terms to provide a general understanding of how elements from the source texts are chosen for the summarized output: centroid-based methods [Thaiprayoon, Unger, Kubek, 2021], graph-based methods [Polyakova, Zaitsev, 2022; Yadav et al., 2023], term-based methods [Orasan, Pekar, Hasler, 2004], bottom-up attention [Gehrmann, Deng, Rush, 2018], ontology-based methods [Mohan et al., 2016].

Centroid-based methods determine the importance of text elements by comparing them to a 'centroid', a central point that epitomizes key elements in the data set [Puduppully et al., 2023; Thaiprayoon, Unger, Kubek, 2021]. Graph-based methods visualize and analyze relationships between text elements [Belwal, Rai, Gupta, 2021; Polyakova, Zaitsev, 2022; Yadav et al., 2023]. Term-based methods focus on the term frequency (TF) and inverse document frequency (IDF), or term weights [Mishra, Naruka, Tiwari, 2023; Orasan, Pekar,

Hasler, 2004]. Bottom-up attention methods prioritize keywords and proper names to grasp the document's theme.

These methods of primarily extracting sentences characterize extractive summarization. Abstractive summarization uses ontology-based methods, employing structured knowledge representations to understand deeper semantic aspects like synonymy and polysemy.

Materials and methods

To illustrate the process of automated summarization, four articles covering a spectrum of topics were analyzed. The article *The Emergence of Convergence* (hereinafter – T1; Convergence) discusses the transdisciplinary nature of contemporary science, blending elements of social philosophy and scientific methodology. The article *The Path to Smart Farming: Innovations and Opportunities in Precision Agriculture* (hereinafter – T2; Agriculture) delves into the advancements and challenges of precision agriculture, highlighting the innovations in sustainable farming practices. The article *Solar Energy Technology and Its Roles in Sustainable Development* (hereinafter – T3; Solar Energy) explores the applications of solar technology in promoting economic and environmental sustainability. The linguistic publication *Corpus-Based Studies of Metaphor: An Overview* (hereinafter – T4; Metaphor) focuses on the corpus-based analysis of metaphors.

To reduce volume and minimize informational noise, these texts were pre-processed. This included the removal of bibliographic lists, in-text references, footnotes, figures, and graphs. Furthermore, to avoid the influence of centroids, titles, abstracts, headings, and subheadings were also excluded.

Automated summarization tools

For the purposes of the research, four summarization models were selected, namely *WordTune*, *SciSummary*, *Scholarcy* and *OpenAI Summate.it* based on their user-friendly interfaces and proven effectiveness in handling unstructured language data. In recent years, generative pre-trained transformer models, particularly the GPT series, have

gained significant attention due to their ability to process and accurately summarize large volumes of text. This paper addresses the performance and summarization potential of *OpenAI ChatGPT-4*.

Results and discussion

This section presents the results of testing the above listed summarization tools, focusing on their efficiency in text compression, accuracy and lexical proficiency.

OpenAI Summate.it

As already noted, a key expected benefit of automated summarization is the significant reduction in the source text size, measured by metrics like page, word, and character count. Among the models tested, *OpenAI Summate.it* is particularly effective requiring only a hyperlink to access to the source text. Table 1 illustrates the substantial text volume reduction achieved by this tool.

Table 1 shows that the resulting summaries typically fit on one page, though the actual compressed text often occupies less than one full page of the summary document. In practice, summaries consist of about five paragraphs, including the title, with each paragraph having one or two sentences. As a result of the intense compression, the number of words, characters, and lines reduced to 1–2% of the original volume. However, while key ideas are reflected, the summaries can be schematic and less informative.

As a matter of fact, the model combines extractive copy-and-paste methods with synonym substitutions typical of abstractive techniques. To illustrate these points, examine some specific examples of the sentences generated by *Summate.it* compared to those in the source texts.

The first example shows only minor syntactic alterations, namely the relocation of the adverbial modifier of time 'in 2016'. (T1) ***In 2016, the U.S. National Science Foundation launched an initiative prioritizing support for convergence research*** (source text). – *The U.S. National Science Foundation (NSF) launched an initiative **in 2016** prioritizing support for convergence research* (summary). It is important to acknowledge that placing the adverbial modifier at the start of the sentence appears more appropriate than its position in the revised sentence. The present participle '*prioritizing*' functions adjectivally and should immediately follow the noun 'initiative' it modifies, to avoid sentence semantic shifts.

Another example presents the combining of two simple sentences into a compound one without a loss of meaning: (T3) *It plays a significant role in achieving sustainable development energy solutions* and <...> *...The massive amount of solar energy attainable daily makes it a very attractive resource for generating electricity* (source text). – *Solar energy plays a substantial role in achieving sustainable development energy solutions and is a very attractive resource for generating electricity* (summary).

Furthermore, *Summate.it* proves to be aware of various grammatical constructions and the ways to handle them. Thus, in the following case a gerundial phrase of the original sentence is transformed into an attributive subordinate clause in the summary. Source text (T2) reads: *Precision agriculture is a management strategy **for addressing geographical and temporal***

Table 1. **Quantitative changes in source text volume using the *OpenAI Summate.it* model**

	Text	Pages	Words	Characters (no spaces)	Characters (with spaces)	Paragraphs	Lines
T1	Source text	10	7,487	43,512	50,944	43	529
	Summary	1	82	573	654	5	9
Summary / Sourcetext, %		10	1.1	1.3	1.3	12	1,7
T2	Source text	14	9,366	59,068	68,382	57	738
	Summary	1	168	1,084	1,251	5	15
Summary / Sourcetext, %		7	1.8	1.8	1.8	9	2
T3	Source text	8	3,958	22,617	26,523	50	321
	Summary	1	78	482	559	5	8
Summary / Source text, %		12,5	2	2	2	10	2,5
T4	Source text	6	3,845	21,683	25,485	44	287
	Summary	1	94	548	641	5	9
Summary / Source text, %		16	2.4	2.5	2.5	11	3

variabilities in agricultural fields (source text). – *Precision agriculture is a management strategy that addresses variabilities in agricultural fields* (summary).

Following a similar pattern but in a reverse direction, another example shows the alteration of an attributive subordinate clause – *that involves data and contemporary technologies* (source text) into a gerundial phrase *by utilizing data and contemporary technologies* (summary).

Particularly noteworthy are sentences that integrate the information from several sentences. Thus, the original sentence (T2) *The integration of digital technologies into agriculture **has opened up** new opportunities and possibilities, **revolutionizing** the way farmers manage their crops, resources, and operations* (source text) gets extended and combines a few sentences into the following one: *The integration of digital technologies, such as big data analytics, machine vision technology, the Internet of Things (IoT), and artificial intelligence (AI), **is revolutionizing** precision agriculture and paving the way for smart farming* (summary). Here we can note the alteration in the predicate tense form, in fact, the transformation of the participle construction into the predicate, though such changes are self-evident during the transformation process.

Similarly, sentences compile data from multiple sections of the source text into parallel syntactic structures, as in the following example: (T2) *New trends in precision agriculture include the use of big data analytics **for decision making**, machine vision technology **for accurate data collection**, the IoT **for real-time monitoring** and control, AI and machine learning **for data analysis and prediction**,*

*guidance systems **for optimized field operations**, and blockchain technology **for secure data sharing*** (summary).

As seen in the following examples, the obtained summaries demonstrate the model's ability to handle synonymic substitutions: (T4) *The **analysis** of metaphor-related research studies published between 2015 and 2020 **revealed**...* (source text). – *A systematic **review** of metaphor-related research studies published between 2015 and 2020 **found**...* (summary); (T4) <...> *...The thematic analysis **unearthed** potential gaps and under-researched areas* (source text). – *The thematic analysis **identified** gaps and under-researched areas* (summary).

WordTune

Another AI-powered writing assistant tested in the current research is *WordTune* by Israeli AI company *AI21 Labs*. The assistant helps users refine their writing, particularly benefiting non-native English speakers and professionals. *WordTune* integrates with web browsers and word processors, offering real-time suggestions to rewrite sentences, improve word choice, and adjust tone. *WordTune* also includes a text summarization feature, using natural language processing to understand context and meaning.

The *WordTune* model employs both extractive and abstractive summarization algorithms. In the resulting summaries, some sentences are directly extracted with little alteration. As shown in Table 2, there are significant reductions in various metrics. For instance, document (T1), saw a page reduction from 10 to 3, while the other three texts decreased by half.

Table 2. **Quantitative changes in source text volume using the *WordTune* model**

	Text	Pages	Words	Characters (no spaces)	Characters (with spaces)	Paragraphs	Lines
T1	Source text	10	7,487	43,512	50,944	43	529
	Summary	3	1,601	9,971	11,535	37	136
Summary / Source text, %		30	21	23	23	86	25
T2	Source text	14	9,366	59,068	68,382	57	738
	Summary	7	2,650	16,897	19,460	87	279
Summary / Source text, %		50	28	29	28	**153**	38
T3	Source text	8	3,958	22,617	26,523	50	321
	Summary	4	1,209	7,017	8,184	42	121
Summary / Source text, %		50	30	31	31	84	38
T4	Source text	6	3,845	21,683	25,485	44	287
	Summary	3	1,031	5,769	6,768	32	103
Summary / Source text, %		50	27	27	27	73	37

The number of printed characters with spaces has also significantly decreased: by a factor of 4 in (T1), 3.5 in (T2), 3 in (T3), and 3.8 in (T4).

Similar reductions are observed in the metrics for "number of printed characters without spaces" and "number of lines." The relatively smaller decrease in paragraphs is due to their role in structuring content and signaling completeness. Consequently, almost every paragraph is viewed by the neural network as a source of meaningful information. Notably, in document (T2), the number of paragraphs even increases (see Table 2 **in bold**), indicating the model's ability to highlight semantic nuances.

Though some sentences, or rather phrases, of the source text go to the summary without alterations, a closer analysis of the summary qualitative indicators shows the presence of changes in syntax and semantics, as well assynonymous replacement. Let's consider a few examples. In (T1), *convergence research **may provide opportunities** to confront and navigate Arctic change* (source text) becomes *convergence research **can help** confront and navigate Arctic change* (summary). Similarly, in (T3) the phrase *the global community **is starting to shift towards** utilizing **sustainable energy sources** and reducing dependence on traditional fossil fuels as a source of energy* (source text) is summarized as *decision-makers **are switching to renewable energy sources** and reducing dependence on traditional fossil fuels* (abstract).

Regarding the way the sentence volume is reduced, the summaries produced by *WordTune* show sentence shortening with no transformation, with minor transformation and significant content simplification. Thus, an example from the original text reads *Alternative metrics, such as a potential indicator of creativity, are needed, but these may be more difficult to assess because they will be less tangible* (source text) is succinctly summarized to *Alternative metrics are needed, such as a potential measure of creativity* (summary). It is clear that the sentence is compressed by excluding some words from it, the essence of the content is efficiently maintained.

Minor syntactic transformations can be illustrated by the following example. In text (T1), we read *Problems requiring a convergent approach are problems with nonlinearity* that is transformed to *Convergent approaches are used to solve problems with nonlinearity*. The summary shows grammar changes: the active voice in the source sentence shifts to passive, and the singular noun *approach* becomes plural. There are also pragmatic meaning shifts in the summary. The original sentence focuses on *problems* with the rhema defining them, while the summary shifts to *convergent approaches* as the subject, with the rhema explaining their function. In the next example, a compound sentence is simplified into a shorter simple sentence, reducing word count while retaining the content and pragmatic meaning: (T3) *Solar cells are devices that convert sunlight directly into electricity; typical semiconductor materials are utilized to form a PV solar cell device* (source text). – *Solar cells use semiconductor materials to convert sunlight directly into electricity* (summary).

A significant content and sintactic simplification is evident in cases where complex descriptions are streamlined, as in the reduction of a lengthy discussion in text (T1). *To the greatest extent possible, funding for convergence **processes** should allow for **problem identification** to occur after funding has been granted, and for desired products and outcomes to **be flexible and moving targets** as a reflection of the learning and transformation that should occur **in a convergence proces**s* (source text). – *The problem identification process in a convergence process should be flexible and allow for moving targets* (summary). Only highlighted words of the source sentence are present in the summary, yet in a new combination.

An important issue is the summary's pragmatic inaccuracy, as it becomes too generalized and omits a key point, namely the fact that *the application of technologies* in precision agriculture can *improve performance and environmental quality*, which is the focus of article (T2).

Finally, *WordTune* effectively condenses multiple complex issues into concise summaries without apparent modifications. For instance, a lengthy exposition on the challenges facing precision agriculture is compressed into (T2) ***In the current status of precision agriculture**, there are **several issues**, such as unsustainable resource utilization, long-term monoculture, intensive animal farming,*

*environmental compromises, uneven distribution of digitization, food safety issues, inefficient agrifood supply chain, and lack of awareness of and inertia toward novel changes. These issues **prevent achieving efficiency, productivity, and sustainability** from agricultural production and escalate unintended impacts on ecosystems* (source text). – *In the current status of precision agriculture, several issues prevent achieving efficiency, productivity, and sustainability, and escalate unintended impacts on ecosystems* (summary). The summary sentence is the result of the extactive algorythm performance.

Scholarcy

Developed by Phil Gooch, *Scholarcy* simplifies information processing in academic settings [Gooch, Warren-Jones, 2020]. Analysis shows similar quantitative text reductions as seen with the *WordTune* tool (Table 3).

Scholarcy tool belongs to the extractive summarisation model, based on the PageRank algorithm which identifies key sentences and generates structured summaries resembling sections of a scientific paper.

Note that for the purpose of the current research the article titles, subheadings, and structural indicators were removed from the source texts. Nevertheless, in each received text, the tool assigned the first sentence as the title, but this often did not align with the original title or the text's main idea.

As a matter of fact, the selected sentences neither structurally nor semantically can function as scientific article titles, whose role is to concisely reflect the content and engage readers [Sorokina, Ulanova, 2020]. These pseudo-titles shown in Table 4 alongside with the original titles, highlight and the limitations of the Scholarcy model.

Following the title, every summary features a colour-coded and italicized sentence. It resembles a news lead aiming to attract attention, that is commonplace in journalistic practices, though rare in scientic publications.

Analysis reveals that these introductory sentences are often extracted from the article's final part and fail to serve their intended purpose, appearing either meaningless or misleading. This likely occurs because the final part of a scientific text often contains the core idea, synthesised and explained [Sorokina, 2016], which the summarizer

Table 3. **Quantitative changes in source text volume using the *Scholarcy* model**

Text		Pages	Words	Characters (no spaces)	Characters (with spaces)	Paragraphs	Lines
T1	Source text	10	7,487	43,512	50,944	43	529
	Summary	3	1,779	10,437	12,166	56	150
Summary / Source text, %		30	24	24	24	130	28
T2	Source text	14	9,366	59,068	68,382	57	738
	Summary	3	1,124	7,281	8,373	38	106
Summary / Source text, %		21	12	12	12	67	14
T3	Source text	8	3,958	22,617	26,523	50	321
	Summary	2	1,002	5,652	6,620	39	92
Summary / Source text, %		25	25	25	25	78	29
T4	Source text	6	3,845	21,683	25,485	44	287
	Summary	2	1,058	5,820	6,845	39	88
Summary / Source text, %		33	28	29	27	87	31

Table 4. **Comparative analysis of the source text titles and the summary titles defined by *Scolarcy***

Texts	The title of the source text	"The title sentence" of the summary defined by *Scolarcy*
T1	The Emergence of Convergence	Science is increasingly a collaborative pursuit
T2	The Path to Smart Farming: Innovations and Opportunities in Precision Agriculture	Precision agriculture is a management strategy for addressing geographical and temporal variabilities in agricultural fields
T3	Solar Energy Technology and Its Roles in Sustainable Development	With reference to the recommendations of the UN, the Climate Change Conference, COP26, was held in Glasgow, UK, in 2021
T4	Corpus-Based Studies of Metaphor: An Overview	The classical theorists of metaphors believed that metaphor functions as a literary device to create an artistic effect

attempts to extract, though unsuccessfully, as shown in the following examples.

(T1) Lead: *The three transcendent-style workshops undertaken in the New Arctic convergence workshops each represented a broadening of the problem definition and the voices and disciplines represented in the room* (summary). The phrase aligns with the first sentence of the article's conclusion following academic writing conventions, where paragraphs present a clear and logical progression [Sorokina, 2016]. Typically, each paragraph starts with a Topic Sentence that introduces the central idea or theme, sets the tone, and links to the main thesis.

The algorithms of neural models are calibrated to recognize such structural elements in scientific texts. However, since the text under analysis is written by a biological author, not bound by algorythms, the semantic weight is carried by the Concluding Sentence, which is also common in academic writing.

(T2) Lead: *This study examined the rheological properties and printing performances of edible inks made from soy protein isolate, wheat gluten, and rice protein* (summary) is absolutely misleading to the potential reader. In fact, the resource text analyses precision agriculture proposals and describes their applications: *Throughout this review, successful precision agriculture proposals and real-world implementations are analysed* (source text). The article explains how this field can continually evolve to support sustainable farming practices: *we aim to provide a comprehensive understanding of how this field can continually evolve to support sustainable farming practices* (source text).

(T3) Lead: *The Paris Climate Accords is a worldwide agreement on climate change signed in 2015, which addressed the mitigation of climate change, adaptation and finance* (summary). This lead is extracted from the introduction section of the source text and fails to convey the factual aim or significance of the entire article. The actual research purpose is stated later in the introduction: *The significance of this paper is to highlight solar energy applications to ensure sustainable development; thus, it is vital to researchers, engineers and customers alike. The article's primary aim is to raise public awareness and disseminate the culture of solar energy usage in daily life, since moving forward, it is the best* (source text).

Building on the postulate that the semantic node of a paper is often encapsulated towards the end [Sorokina, 2016], a more suitable leading idea can be recognised in the final section better reflecting the publication's central ideas: *This paper highlights the significance of sustainable energy development. Solar energy would help steady energy prices and give numerous social, environmental and economic benefits* (source text). This observation again leads us to a conclusion about the limitations in the summarizing capabilities of *Scholarcy*. In fact, Scholarcy failed to identify the most important issue that the source article focuses on and instead selected an insignificant statement for the lead.

(T4) Lead: *The findings revealed that the overall mean of 3.83 research studies related to metaphor using the corpus approach per year seems low for six years* (summary) can be found in the Findings section of the original article. To a certain extent, this statement addresses one of the research questions: *What is the trend of metaphor study that uses the corpus approach in the last six years (2015–2020)?* (source text). However, the article also discusses more interesting questions such as *What are the potential gaps and under-researched areas in the analyzed literature?* (source text).

The obtained summaries featured highlighted sections like the Abstract, Scholarcy Highlights, and Scholarcy Summary, including marked parts such as the Introduction, Objectives, Results, Conclusion, and Future Work. The Scholarcy model selected full sentences, multiple sentences, or entire paragraphs without modification. Despite this, the model's structured approach ensures the summaries are both readable and effectively convey the key elements of the source text.

SciSummary

The next automated abstracting tool, *SciSummary*, employs algorithms specifically designed for generating summative abstracts. The generated abstracts not only exhibit significant compression of length (Table 5) but also demonstrate characteristics of a successful academic abstract that provides an overview of the main points, findings, and conclusions of the text.

Table 5. **Quantitative changes in source text volume using the *SciSummary* model**

Text		Pages	Words	Characters (no spaces)	Characters (with spaces)	Paragraphs	Lines
T1	Source text	10	7,487	43,512	50,944	43	529
	Summary	0.5	255	1,591	1,838	9	24
Summary / Source text, %		5	3	4	4	21	5
T2	Source text	14	9,366	59,068	68,382	57	738
	Summary	0.5	406	2,730	3,134	3	34
Summary / Source text, %		3	4	5	5	5	5
T3	Source text	8	3,958	22,617	26,523	50	321
	Summary	0.5	239	1,505	1,739	6	22
Summary / Source text, %		6	6	7	7	12	7
T4	Source text	6	3,845	21,683	25,485	44	287
	Summary	0.5	167	989	1 150	4	16
Summary / Source text, %		8	4	5	5	9	6

Note. T1 – Convergence; T2 – Agriculture; T3 – Solar Energy; T4 – Linguistics.

The examples are excerpts from each summary received:

(T1) *The article... **discusses** the increasing importance of collaboration in modern science to address complex societal problems. It **highlights** the U.S. National Science Foundation's prioritization of convergence research as a means to solve such challenging issues. **The authors provide** their understanding of the objectives of convergence research **and outline** the conditions and processes essential for successful convergence research.*

(T2) ***The paper discusses** the application of advanced digital technologies in precision agriculture... It **emphasizes** the importance of site-specific management decisions in agriculture, considering factors such as soil and climate properties... <...> **The paper discusses** the role of big data analytics, machine vision, the Internet of Things (IoT), artificial intelligence (AI), machine learning (ML) and deep learning (DL) in modern agriculture...*

(T3) ***The research paper discusses** the importance of sustainable energy development, **particularly focusing on** solar energy applications in... It **highlights** key international agreements such as... **The paper emphasizes** the increasing demand for...*

(T4) ***This review paper discusses** the use of metaphors, **particularly** in everyday language, and… **The paper presents a systematic review of**... **The review emphasizes** the trends, gaps, and under-researched areas **in the analyzed literature**. It **showcases** the distribution of published research...*

Even a cursory glance at these summaries detects that they follow the structure of a scientific article abstract.

OpenAI ChatGPT-4 (Generative Pretrained Transformer)

Today, both users and developers unanimously acknowledge that generative pre-trained transformer models, like *OpenAI ChatGPT-4,* excel at processing unstructured linguistic data and generating concise summaries. However, due to their brevity and lack of paragraph division, details on page, paragraph, and line counts are omitted (see Table 6). In terms of word and character count, *OpenAI ChatGPT-4* demonstrated the most substantial reduction among all tested AI summarization models.

These summaries successfully encapsulated the main ideas of the source texts, namely (T1) – *convergent research, social-ecological challenges, transdisciplinary approach, the Arctic, novel scientific approaches and solutions*; (T2) – *analysis of the evolution and impact of precision agriculture, its current state, challenges, and future directions, the incorporation of technologies such as IoT, AI, ML, robotics, and blockchain in precision agriculture*; (T3) – *the potential and challenges of solar energy technology, historical development of solar energy, the advancement of photovoltaic and concentrated solar power technologies, the economic, social, and environmental impacts of solar energy deployment*; (T4) – *the use of metaphors in*

Table 6. **Quantitative changes in source text volume using *OpenAI ChatGPT-4***

Text		Words	Characters (no spaces)	Characters (with spaces)
T1	Source text	7,487	43,512	50,944
	Summary	109	743	850
Summary / Source text, %		1.5	1.7	1.7
T2	Source text	9,366	59,068	68,382
	Summary	160	1 013	1172
Summary / Source text, %		1.7	1.7	1.7
T3	Source text	3,958	22,617	26,523
	Summary	127	788	914
Summary / Source text, %		3	3.4	3.4
T4	Source text	3,845	21,683	25,485
	Summary	93	559	652
Summary / Source text, %		2.4	2.5	2.5

various discourses, the importance of metaphors in language and communication, a corpus-based approach, areas that require further exploration. Furthermore, the model skillfully utilizes clichés and indirect speech verbs such as *provides an in-depth analysis*, *focuses on*, and *examines* to mirror academic rhetorical structures. Besides, when analyzing the linguistic components of these summaries, it becomes apparent that ChatGPT often generates novel word combinations that were not present in the original texts. For example, while the source text (T1) mentions *the concept of ecological resilience*, *the concept of a solution*, the summary refers to *the concept of convergence research*, introducing a new collocation; (T2) describes different types of research, such as *statistical analysis*, *image analysis*, *soil analysis*, *on-site analysis*, *real-time analysis*, the summary gives a qualitative characteristic of an in-depth analysis. Similarly, in (T2) there are the following word combinations *a comprehensive understanding*, *comprehensive frameworks*, with the descriptor *comprhensive*. In the summary text we find *a comprehensive examination*.

Additionally, the model's ability to infer central ideas and rephrase them with different words is woth commenting on. This capability highlights its proficiency in generating paraphrased content that preserves the original meaning while presenting it in a new form. Consider the following examples.

(T1) analyses the possibilities of *a convergent approach* to solving complex problems, while the summarized text indicates that the source article describes the need for *broad-based research support mechanisms*, but the adjective *broad-based* is not used in the source text. Both the Cambrige and Oxford Dictionaries agee that *convergent* means *coming closer, meeting, becoming similar*; *something that will affect many different places, activities, etc.* However, there is a certain inconsistency in the definition of the compound adjective *broad-based*. The Cambridge Dictionary states that *broad-based* is *used to describe something that will affect many different places, activities, etc.*, while the Oxford dictionary defines the adjective as *based on a wide variety of people, things or ideas; not limited*.

As for OpenAI ChatGPT-4 itself, it interpretes these adjectives in a similar way and describes convergent research as *a multidisciplinary approach that integrates knowledge, methods, and expertise from various scientific fields to address complex problems. This type of research aims to **bring together different disciplines** to converge on a **shared goal or solution*** (*OpenAI ChatGPT-4*). According to OpenAI ChatGPT-4, broad-based research ***encompasses a wide range of subjects, disciplines, or methods** to provide **comprehensive insights or solutions*** (*OpenAI ChatGPT-4*). Thus, both convergent research and broad-based research are considered interdisciplinary or multidisciplinary approaches. They aim to leverage insights from multiple fields to enhance the depth and breadth of understanding complex issues. These approaches recognize the value of integrating diverse perspectives to tackle broad, multifaceted problems.

The summary (T3) identifies *intermittency* as a challenge of solar energy though the specific term *intermittenc*y is not used in the source text. The neural network likely derived this conclusion from the following sentence: *It is important to mention here the operational challenges of solar energy in that it does not work at night, has less output in cloudy weather and does not work in sandstorm conditions* (source text). Looking up the lexeme *intermittency* in dictionaries, we find out that both the Cambrige and Oxford Dictionaries define it as *the fact of stopping and starting repeatedly or with periods of time in between. OpenAI ChatGPT-4* shares the point and gives the following definition: *Intermittency is a noun that describes the quality or state of being intermittent – occurring at irregular intervals, not continuous or steady. It is commonly used to refer to phenomena that start and stop at intervals rather than proceeding continuously* (OpenAI ChatGPT-4). The model elaborates on the context associated with this noun, particularly in electricity supply, noting the intermittent nature of power sources like wind and solar, which depend on conditions. Given the article's key idea (T3), *intermittency* accurately reflects how solar energy is supplied. This highlights ChatGPT's skill in simplifying complex information and occasionally introducing new vocabulary, demonstrating both its strengths and challenges in AI-driven summarization.

Conclusion

In reviewing automated summarization methods that integrate advancements in computer science, artificial intelligence, and linguistics, it becomes evident that these techniques hold significant potential for processing large volumes of textual data. Algorithms that analyze and generate text, while preserving its core meaning and structure, offer a robust tool for scientific text processing. Extractive methods excel in maintaining accuracy by capturing key phrases and sentences, thereby preserving the original language and style of the text, which makes them particularly effective for factual and informational content. However, due to their reliance on formal determinants, extractive summarization algorithms might overlook subtle nuances, potentially omitting critical aspects of the text. Additionally, such automatic summarizations do not always yield coherent and logical outcomes.

Contrastingly, abstractive techniques can produce more coherent and succinct summaries that capture the essence of the source material more effectively. Yet, while these methods can enhance the clarity and brevity of summaries, they may introduce alterations that hypothetically distort the original information. Therefore, it is crucial to acknowledge and understand the limitations inherent to each model, including those related to linguistic and contextual factors. As we continue to explore these technologies, refining their capabilities will be essential for enhancing their accuracy and reliability in various applications, ensuring that they serve as invaluable assets in the realm of informational synthesis.

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TEXTS OF DIFFERENT EMOTIONAL CLASSES
AND THEIR TOPIC MODELING [1]

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Abstract. The article is devoted to studying verbalization specifics of various emotional states in the texts in the Russian language with the purpose to confirm or refute the hypothesis that texts of different emotional classes reflect the denotative situation not identically, which is reflected in thematic specifics and lexical content. The research material consisted of eight corpus texts in the Russian language, which were extracted from the public pages of the social network VKontakte. The texts were selected according to emotional hashtags that corresponded to eight basic emotions, according to H. Lövheim's model: anger, surprise, shame, enjoyment, disgust, distress, excitement, fear. The correspondence of emotion and hashtag was established in a preliminary psycholinguistic experiment. While analyzing the text collection, we used the method of computer thematic modeling to identify statistically non-random groups of words (topics). We applied the BERTopic neural network model to the collected data. As a result of the analysis, it was found that texts of 8 emotional classes contain an uneven number of topics, despite the fact that their number does not correlate directly with the amount of data: with a relatively small amount of data, there may be many topics, but in a voluminous corpus – few. The sets of words (tokens) that make up each non-random group (topic) differ in each subcorpora, reflecting the specifics of the denotative situation, which is formed under the influence of the emotional state of the speaker. The idea of diverse thematic "granularity" of texts of different emotional classes is theoretically justified.

Key words: emotions, denotative situation, topic modeling, social network texts, Russian language.

ТЕМАТИЧЕСКОЕ МОДЕЛИРОВАНИЕ ТЕКСТОВ
РАЗНЫХ ЭМОЦИОНАЛЬНЫХ КЛАССОВ [1]

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Аннотация. Статья посвящена проблеме вербализации различных эмоциональных состояний в текстах на русском языке. Цель работы – подтвердить или опровергнуть гипотезу о том, что тексты разных эмоциональных классов неодинаково отражают денотативную ситуацию, имеют тематическую специфику и не идентичное лексическое наполнение. Материал исследования составили восемь подкорпусов текстов на русском языке, которые были извлечены из пабликов социальной сети ВКонтакте. Тексты отобраны

по эмоциональным хэштегам, которые соответствуют восьми базовым эмоциям, согласно модели Г. Лёвхейма: злость, удивление, стыд, радость, отвращение, печаль, воодушевление, унижение. Соответствие эмоции и хэштега было установлено в предварительном психолингвистическом эксперименте. Для анализа текстовой коллекции использовалась техника выделения статистически неслучайных групп слов (тем) при помощи компьютерного алгоритма – метод компьютерного тематического моделирования. К собранным данным применена нейросетевая модель BERTopic. В результате анализа было выявлено, что тексты разных эмоциональных классов содержат неодинаковое количество тем, при том, что их число не коррелирует непосредственно с объемом данных: при сравнительно небольшом объеме данных может быть много тем, а в объемном корпусе – мало. Наборы слов (токенов), составивших каждую неслучайную группу (тему), отличаются по подкорпусам, отражая специфику денотативной ситуации, формирующуюся под влиянием эмоционального состояния говорящего. Теоретическое обоснование получает идея о специфической тематической «гранулярности», характерной для текстов разных эмоциональных классов.

Ключевые слова: эмоции, денотативная ситуация, тематическое моделирование, тексты в социальных сетях, русский язык.

Introduction

This publication is devoted to the problem of emotional analysis of text data. We formulate the research question as follows: is there a stable correlation between the topics that receive formal expression in words with high statistical significance for the text, and the emotion that the author of the text seeks to express? The search for an answer to this question lies in three overlapping subject areas: psycholinguistics, textology, and automatic text processing. In the latter, there is great interest in the use of topic modeling models. The topic modeling of a collection of textual documents determines which topics each document belongs to and which words form each topic. To do this, each topic is described by a discrete probability distribution of words, and each document is described by a discrete probability distribution of topics. Essentially, this model performs a soft clustering of documents. In this paper we consider the results of applying the BERTopic model to topic modeling of texts retrieved from the VKontakte "Overheard" public group and published under different emotional hashtags, which were then correlated with eight classes of emotion, according to H. Lövheim's emotion model [Lövheim, 2012].

Related papers

It should be said that emotion analysis of texts is an increasingly popular research branch of the affective computing paradigm [Picard, 1997], which seeks to solve such problems as detecting different emotions expressed by humans in texts and classifying texts according to the leading emotion criterion [Blei, Ng, Jordan, 2003; Hakak et al., 2017; Li et al., 2007].

To solve both of the above tasks, expert linguistic attempts have been repeatedly made to identify some verbal and paraverbal markers of texts of a particular emotional class in order to use them as parameters fed to machine learning models as input [Kolmogorova, Kalinin, Malikova, 2019].

On the other hand, there is a well-established tradition in textual studies of identifying the emotional and semantic dominant of a text which is understood as a certain attitude, the center of interest, and therefore a certain position in all kinds of human verbal and averbal life [Shakhovsky, 2010, p. 41].

Based on the consideration of this dominant, attempts were made to psycholinguistically typologize texts into light, sad, funny, active, simple (cruel), beautiful, tired, complex and mixed [Belyanin, 2000]. It is established that for each of these types it is possible to identify a specific range of topics, a list of predicates. For example, on the material of dialect texts Y.V. Kositsina revealed that in the sad texts the external location prevails over the internal. Moreover, such texts are marked by the topics of the vicissitudes of fate and family, the sense of the inevitability of death, defenselessness of man before the laws of existence, the opposition of thematic spaces of past and present, the presence of words containing semantic components "solitude", "blindness", "gravity" [Kositsina, 2013].

Similarly, but using a neural network, we attempted to determine the groups of words that are most likely characteristic to the texts published by users of the social network VKontakte under the emotional hashtags corresponding to a particular emotion. By default, we suppose that such statistically significant words are topic cues that anchor main text themes.

Materials and methods

The research data consisted of eight sub-corpora of texts from VKontakte. Their volume and the hashtags used to extract the text data are presented in Table. Each subcorpus is named according to the emotion with which it is associated.

We emphasize that the adequacy of the correlation between hashtags and emotional classes was tested experimentally in a group of 35 students, who in two experimental series were asked to correlate texts and emotional classes (160 texts were presented). We then calculated the percentage of the texts with certain hashtags that fell into a sample of one class or another. Thus, if more than 80% of the texts presented in the sample with a hashtag were associated by the informants with a particular emotion, the hashtag was considered reliable; if less than 80%, the hashtag was discarded.

As the main method, we used topic modeling by the BERTopic model, which, as research shows, is significantly superior in a number of parameters to the well-known model based on Latent Dirichlet Allocation [Sia, Dalmia, Mielke, 2020].

BERTopic generates "topics" in three stages: first, each document on the basis of the already trained model receives a vector representation,

then, to conduct clustering, the dimensionality of vectors is reduced, finally, in the last stage, when the documents are already clustered, based on the standard tf-idf measure, the topics themselves are extracted from the clusters – lexemes or word forms that have the highest weight for these texts [Grootendorst, 2022]. In other words, each topic suggested by the model represents a group of words which are statistically relevant for the text or text collection. Word forms entering the same group are called its "terms".

We used the Uniform Manifold Approximation and Projection model to reduce the dimensionality of the vectors, and the Hierarchical Density-Based Spatial Clustering of Applications with Noise method to cluster word forms.

The results of the topic modeling (topics, terms and their weights, as well as similarity matrices and distances between topics) of the texts of each of the eight emotional classes were compared with each other, and the results of the comparison were interpreted.

Results and discussion

Low Degree of Topical Granularity: Anger, Distress and Excitement

Despite the rather large size, compared to the other subcorpora, the subcorpus of "angry" texts allowed the model to identify only three topics (see Fig. 1).

The first topic contains a typical gist for the posts of this group – *pissing off people who...* (бесят люди, которые...); the second reflects the negative attitude of people living in Russia towards those who live or want to live, or pretend to live abroad; finally, the third topic represents the word forms that reflect the intensity of feeling the

Subcorpora size and hashtags

Subcorpus	Size in tokens	Hashtag
Anger	131 564	#Подслушано_БЕСИТ
Disgust	45 868	#Подслушано_фуу
Distress	56 470	#Подслушано_одиночество
Enjoyment	85 117	#Подслушано_счастье
Shame	70 232	#Подслушано_стыдно
Excitement	184 074	#Подслушано_успех
Surprise	288 272	#Подслушано_наблюдения #Подслушано_иллюстрация #Подслушано_странно
Fear	230 730	#Подслушано_страшно

emotion of anger: obscenisms, interjections, invectives.

From the subcorpus of "sad" texts it was also possible to extract only three topics (Fig. 2): the first is related to the idea of the finitude of time, the second – to the idea of loneliness, and the third – of love.

Even two topics were found by the model in the subcorpus of texts, showing the excitement (Fig. 3) despite the fact that this, as well as the subcorpus of "angry" texts, is one of the largest subcorpora in the sample.

The first topic manifests the idea of time, while the second is related to effective weight loss. Interestingly, this subcorpus represented a variety of situations that evoked the emotion of elation-not just those related to long-awaited weight loss (examples 1–2), but the model apparently had difficulty to cluster them:

(1) I teach a foreign language. I was invited to lead a group of eight people in a foreign language studio; I came – and there are all men and guys. All good-looking, intelligent, educated, and all unmarried! I am ugly, fat, short, unremarkable and unattractive absolutely; I do not know what happened, but all the students come to class with a perfectly prepared homework, dressed with a needle, smelling of perfume, stretching their hands, want to answer, and the fourth student asked me out. At home there are bouquets from two other students. Either it's the magic of the German language, or I don't even know...

Я преподаю иностранный язык. Меня пригласили руководить группой из восьми человек в студии иностранных языков; я пришла – а там сплошь мужчины и парни. Все красивые, умные, образованные и все неженатые! Я некрасивая, толстая, низкорослая, ничем не примечательная и абсолютно непривлекательная; я не знаю, что случилось, но все ученики приходят на урок с идеально подготовленным домашним заданием, одетые с иголочки, пахнущие духами, протягивают руки, хотят ответить, и четвертый ученик пригласил меня на свидание. Дома меня ждут букеты от двух других студентов. То ли это волшебство немецкого языка, то ли я даже не знаю...

(2) My wife gave me a ticket to the World Cup finals. She bought it long beforehand, as a surprise. She gave me half my salary, poor thing. Now my wife,

Fig. 1. Topics and terms of texts manifesting the emotion of anger

Fig. 2. Topics and terms of texts manifesting the emotion of distress
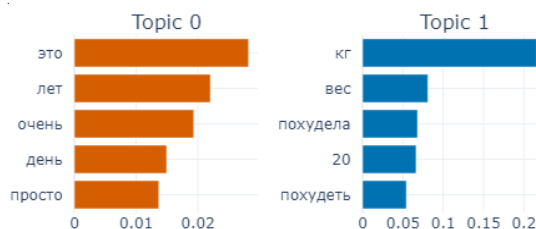
Fig. 3. Topics and terms of texts manifesting the emotion of excitement

father-in-law, and mother-in-law and I are flying to Hawaii. A fan from France bought my ticket for 100 times the price! I love my wife. And I never liked soccer.

Моя жена подарила мне билет на финал Чемпионата мира. Она купила его задолго до этого, в качестве сюрприза. Бедняжка, она отдала мне половину моей зарплаты. Сейчас мы с женой, тестем и тещей летим на Гавайи. Болельщик из Франции купил мой билет в 100 раз дороже! Я люблю свою жену. И мне никогда не нравился футбол.

Middle Degree of Topical Granularity: Disgust, Fear, Shame

The opposite of the previously analyzed case situation is observed in modeling the subcorpus of "disgusting" texts: although they are the smallest in volume, they allowed the model to extract 9 topics.

Among them predictably well stand out topics related to the physiological and bodily spheres (Fig. 4): toileting, washing the body and hair, male-female relations, women of the family, olfactory sensations, and body parts such as the mouth.

The similarity matrix, by the way, shows that this last topic (0) is very similar to all the other topics that deal with the concepts of relationship of the opposite sexes (Topics 4, 6, 7) (Fig. 5).

In the group of texts manifesting fear (Fig. 6), the model identified six topics: these are topics connected with the subject "persons for whom the fear is felt" (Topic 0 – mother), or the place where the fear is usually felt (Topic 4 – the bathroom and the toilet), or, actually, why the fear is felt, its cause (Topic 1, 2, 5) – a car accident, cancer, mental disorder.

At first glance, the weakly interpreted Topic 3 turns out to be more understandable with the help of the similarity matrix: it is very similar to Topic 0 (Fig. 7).

Thus, these two topics seem to develop the same proposition – the fear that the dearest person, the mother, may leave (*mother*, *her*, *very*), the regret after her demise (*why*, *you know*, *come back*).

The final emotion for this block is the emotion of shame. In this subcorpus, which is small enough, the model has revealed 9 topics (Fig. 8).

In their assemblage we can also identify a number of components of the situation of experiencing the shame: time (*long ago*, *not now* – Topic 8; in school childhood – Topic 2), participants of the shame situation (*husband*, *boyfriend* – Topic 4), emotional reactions (*became very ashamed* – Topic 3), internal experiences (*could not tell anyone* – Topic 7), objects with which the shame was associated – for example, money (Topic 1).
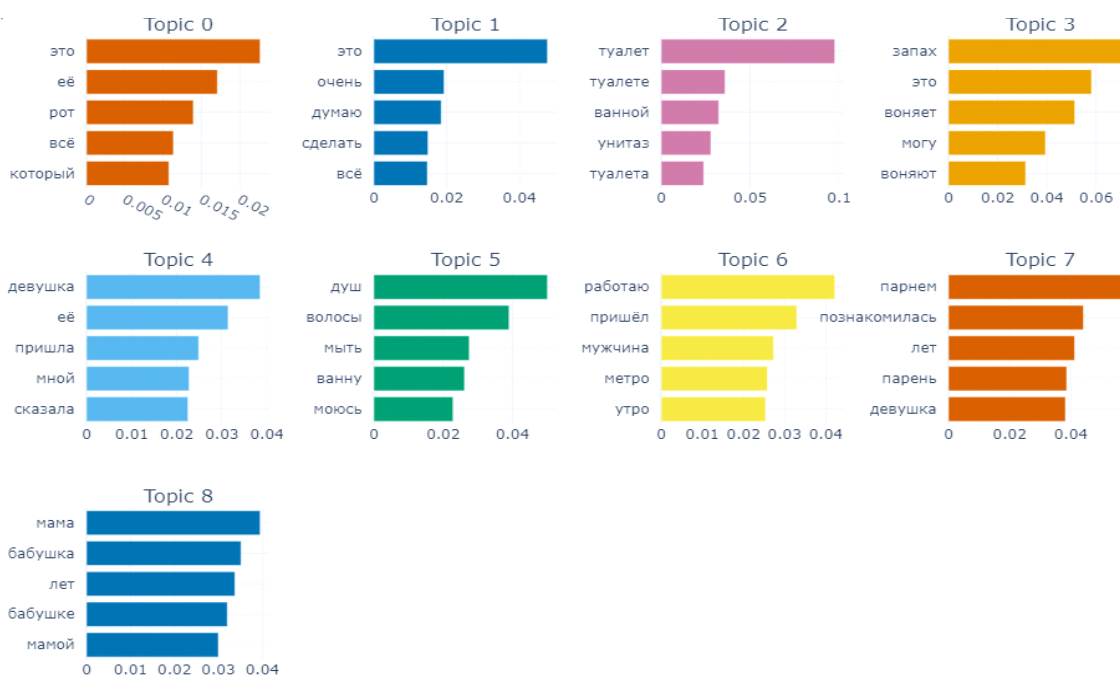
Fig. 4. Topics and terms of texts manifesting the emotion of disgust
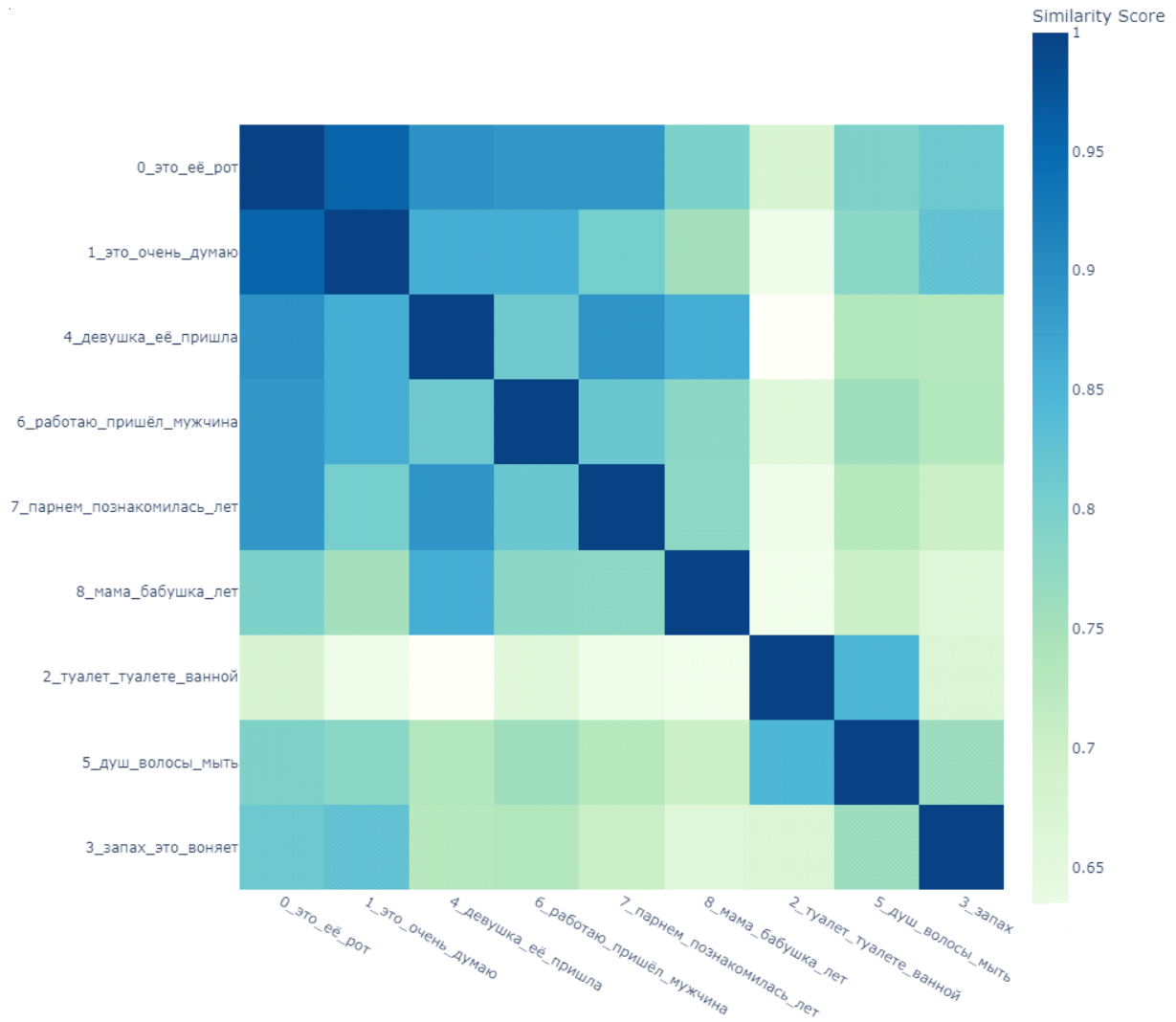
Fig. 5. Similarity matrix for topics in texts manifesting the emotion of disgust
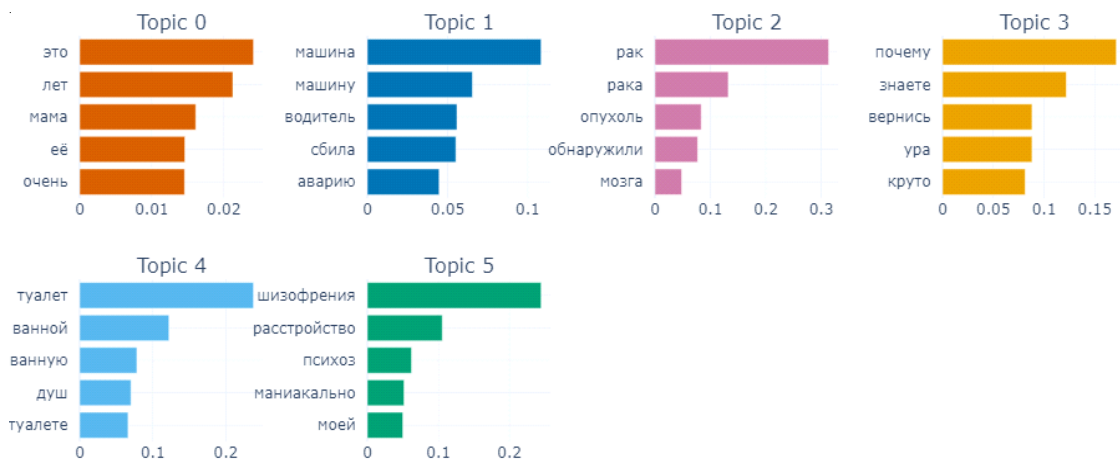
Fig. 6. Topics and terms of texts manifesting the emotion of fear
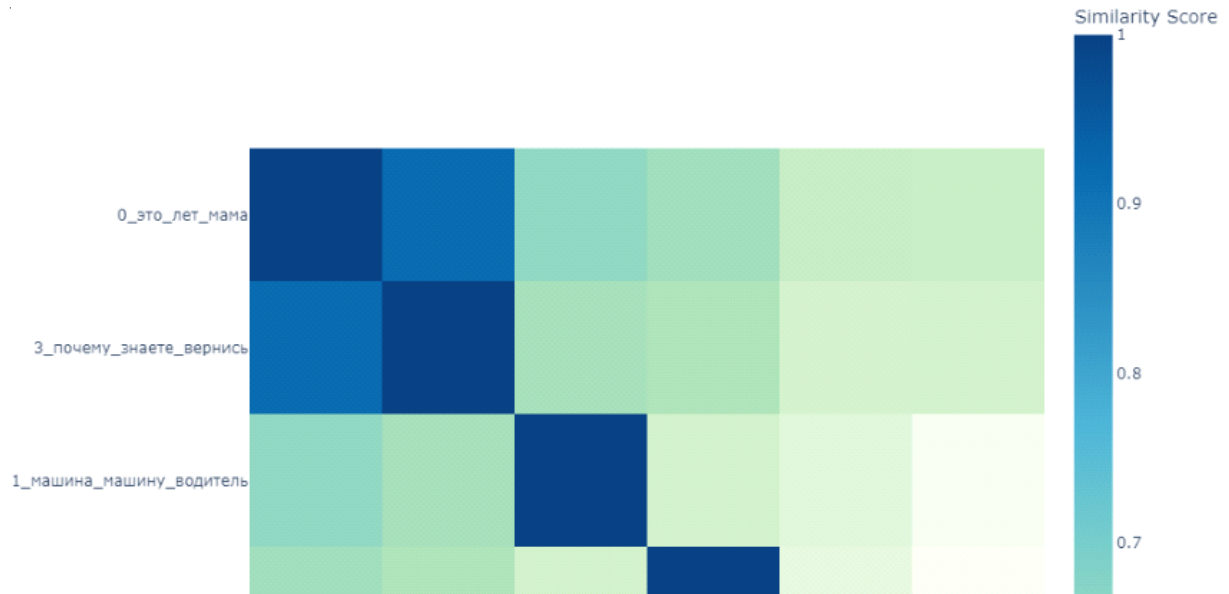
Fig. 7. Similarity matrix for topics in texts manifesting the emotion of fear
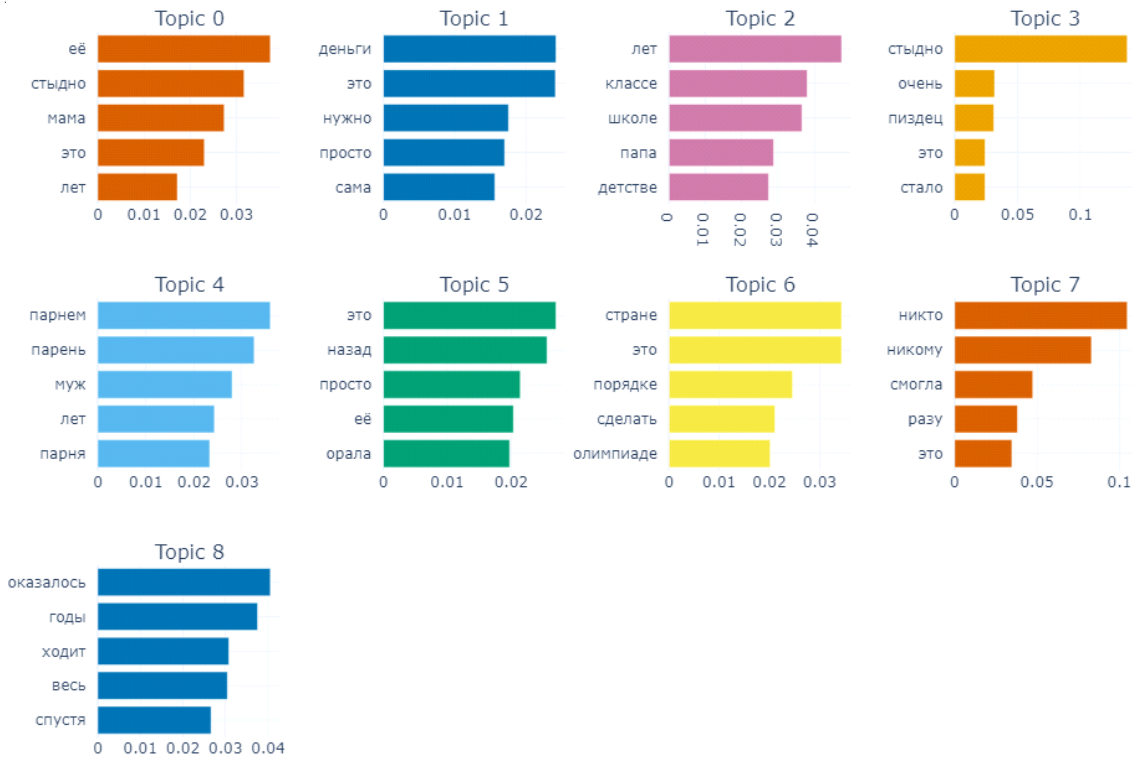
Fig. 8. Topics and terms of texts manifesting the emotion of shame

The analysis of the similarity matrix showed that Topics 5, 6, and 8 have the greatest similarity. The map of distances between topics showed that there are, in general, only two clusters: the first cluster includes Topics 5, 6, 7, and the second cluster includes all the others.

High Degree of Topic Granularity: Enjoyment and Surprise

The subcorpus of "joyful" texts was also easy to process for BERTopic model: 13 topics were identified (Fig. 9).

The topics highlighted by the model are quite harmoniously related: work (Topic 0), happiness (Topic 1, 7), family (Topic 3), love (Topic 4–5), having an apartment (Topic 6), pregnancy (Topic 8),

as well as more frequent reasons for happiness – dental care (Topic 2), hair color (Topic 9), getting rid of extra pounds (Topic 10), successful surgery (Topic 11), birthday (Topic 12).

The distance between the topics (Fig. 10) shows that they form four clusters: the cluster of Topics 7, 1, 9 (happiness + hair color), the leftmost cluster – Topics 5, 11, 8 (girl, surgery, pregnant), the next – Topics 2 and 0, and the fourth – Topics 3, 4, 6, 10 (family+love+flat+weigt loss).

The similarity matrix shows that Topics 2, 5, 7, 9, 12 are the most similar, which seems to reflect the most frequent reasons for happiness: love, changes in hairstyle, birthday.

The largest number of topics was highlighted by the model on the corpus of "surprising" texts (Fig. 11).

Fig. 9. Topics and terms of texts manifesting the emotion of enjoyment

Fig. 10. Intertopic distance map in the subcorpus of texts manifesting the emotion of enjoyment

Note that compared to the previous subcorpora, these topics proved difficult to interpret, but even here we can identify ideas of family (Topic 4), relationships with the opposite sex (Topic 8, 9, 10), fear (Topic 14), shopping (Topic 12), preferences in smells and tastes (Topic 5), and own opportunities (Topic 2).

As the analysis of the similarity matrix showed, Topics 0, 1, and 2 are the most similar to each other – they are related to one proposition, which can be briefly characterized as overcoming oneself: "I thought it would not work, I cannot, but then I started doing it and everything worked out".

As for the distances between topics (Fig. 12), the model identified three clusters.

Topics 0, 3, 6, and 4 were in the first cluster; Topics 9, 8, and 10 were in the second cluster; and all the others were in the third cluster.

Conclusion

The experiment on the application of the neural network model of topic modeling to the pool of emotional texts from social networks allowed us to draw several conclusions.

Firstly, from the point of view of texts' affordances for clustering we can distinguish three groups of emotional texts: "angry", "sad" and "excited" texts cause difficulties in clustering, so they have maximum 3 topics; "shameful", "terrible" and "disgusting" are clustered relatively well – 8–9 topics are identified; finally, "happy" and "surprising" are easily clustered – 12–15 topics.

This observation provides us not so much with some technical information about the specificity of BERTopic, as with the structure and semantics of the texts of different emotional classes. Apparently, it is worth talking about the correlation between the degree of thematic granularity of the texts and the nature of the emotions they are meant to convey: low, middle and high.

Secondly, the topics selected by the model really reflect the specificity of emotional experiences and can be used in the future as
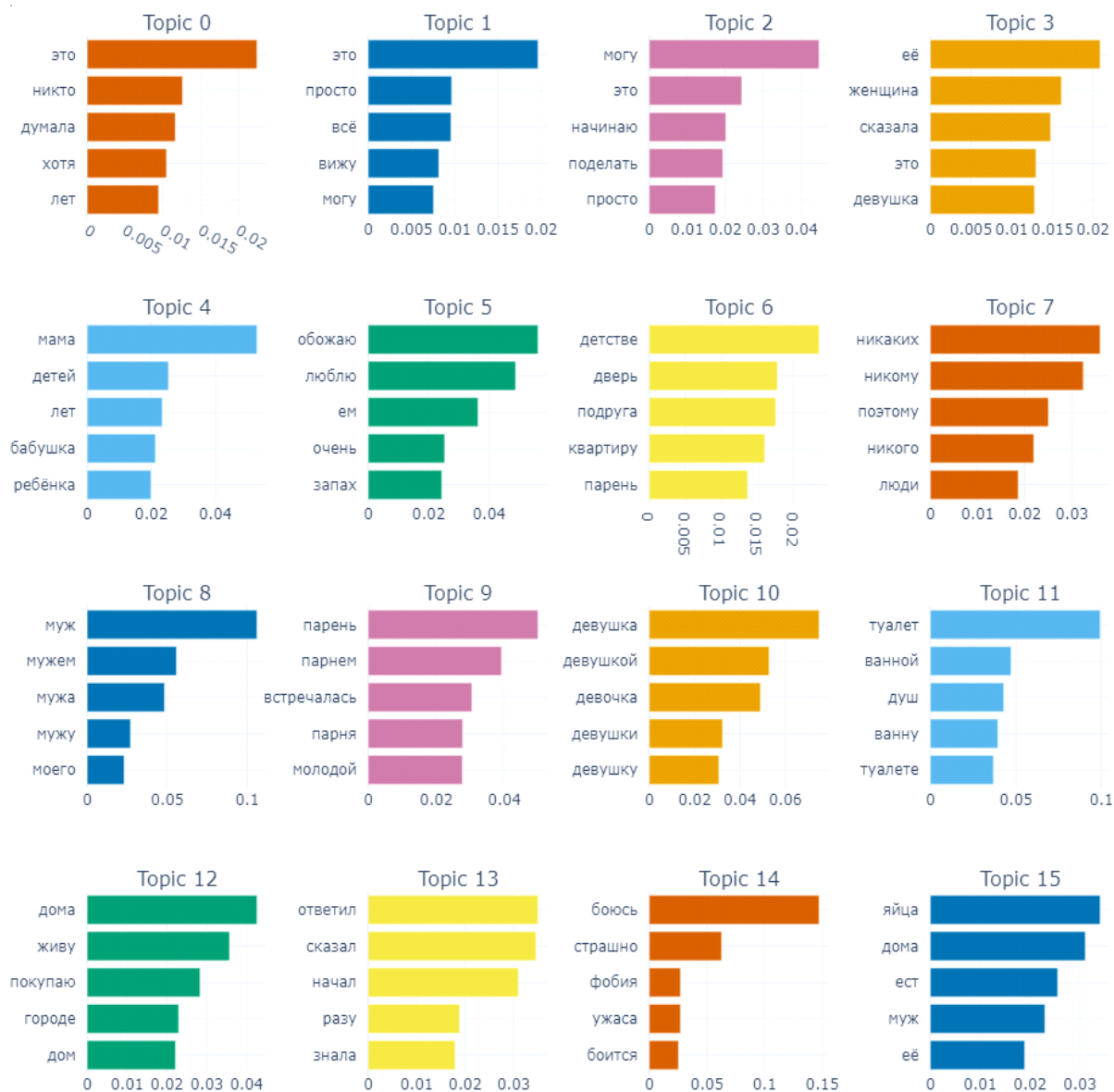
Fig. 11. Topics and terms of texts manifesting the emotion of surprise

attributes for the emotional classification, for the automatic detection of emotions in the texts of social networks.

Third, in the experiment conducted, the hypothesis that there is a correlation between the emotion expressed in the text and the nature of the thematic content was generally confirmed. Despite the fact that a number of topics are "cross-cutting" (e.g., the topic of weight loss is characteristic of both excitement and joy subcorpora, and the topic of relations with the opposite sex is characteristic of happiness, shame, and disgust text classes), the majority of topics are specific (e.g., the topic of time gone is characteristic only of shame text class, and the topic of gastronomy preferences is characteristic only of surprise class).

Thus, we can conclude that the use of the method of topic modeling is a relevant way to describe the specificity of semantics, the thematic deployment of texts of different emotional classes.

NOTE

Fig. 12. Intertopic distance map in the subcorpus of texts manifesting the emotion of surprise

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COMMUNICATIVE TYPE "MUNICIPAL EMPLOYEE"
IN THE MEDIA SPACE: DEVELOPMENT OF AN AUTOMATIC
INFORMATION AND ANALYTICAL ASSESSMENT SYSTEM

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Abstract. The article examines the issue of representing municipal government in the media space, followed by the proposed solution for automatically identifying signs of destructive and constructive positioning of communicative types of municipal employees in the public information space. The definition of the concept of the communicative type "municipal employee" with verification features is introduced. The results of the analysis of the organization of local self-government on the example of the Moscow region allowed us to conclude that the communicative type "municipal employee" reflects a diversified system of territorial communicative position within the regional government. The information obtained during the analysis of public information space attitudes regarding the activities of municipal employees can be automated with the method of identifying linguistic markers of emotivity to determine the communicative position of territorial authorities. The suggested methodology for effective automation of the studied subject area in the humanities has been verified as possessing a high scientific potential for further research. It is concluded that the development of technology for monitoring and forecasting public threats based on "soft power" methods through automatic and expert work to identify markers of evaluative presentation of communicative types of municipal employees is designed to help regional authorities achieve the desired results in ensuring territorial identity.

Key words: communication studies, municipal management, media discourse, digital humanities, markers of emotivity, media image of municipal government, destructeme, constructeme.

КОММУНИКАТИВНЫЙ ТИПАЖ «МУНИЦИПАЛЬНЫЙ СЛУЖАЩИЙ» В МЕДИАПРОСТРАНСТВЕ: РАЗРАБОТКА АВТОМАТИЧЕСКОЙ ИНФОРМАЦИОННО-АНАЛИТИЧЕСКОЙ СИСТЕМЫ ОЦЕНКИ

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Аннотация. В статье исследуются проблемы представления муниципальной власти в медиапространстве с последующим предлагаемым решением автоматического выявления признаков деструктивного и конструктивного позиционирования коммуникативных типажей муниципальных служащих в публичном информационном пространстве. Вводится дефиниция понятия коммуникативного типажа «муниципальный служащий» с верифицирующими признаками. Результаты анализа организации местного самоуправления на примере Московской области позволили сделать вывод о том, что коммуникативный типаж «муниципальный служащий» отражает диверсифицированную систему территориальной коммуникативной позиции внутри региональной власти. Информация, полученная в ходе анализа настроений в публичном информационном пространстве относительно деятельности муниципальных служащих, может быть автоматизирована для определения коммуникативной позиции территориальных органов власти. Такая автоматизация возможна с опорой на метод выделения лингвистических маркеров эмотивности. Показаны проблемы разработки методологии в гуманитарных науках для эффективной автоматизации изучаемой предметной области, которые обладают высоким научным потенциалом для дальнейших исследований. В заключение делается вывод о том, что разработка технологии мониторинга и прогнозирования общественных угроз на основе методов «мягкой силы» путем автоматической и экспертной работы по установлению маркеров оценочной презентации коммуникативных типажей муниципальных служащих, призвана помочь региональным властям в достижении желаемых результатов по обеспечению территориальной идентичности.
Вклад авторов. И.С. Карабулатова – разработка общей концепции исследования и гуманитарной части ее реализации, осуществление когнитивного моделирования; К.В. Воронцов – уточнение разработок технического воплощения идеи и технологической модели А. Околышев – составление датасета, проведение экспериментальной работы, анализ эмпирического материала; Лудань Чжан – разметка текстов, работа с датасетом, обнаружение деструктем, сентимент-анализ, квантитативный анализ эмпирического материала.

Ключевые слова: коммуникативистика, муниципальное управление, медиадискурс, цифровые гуманитарные науки, маркеры эмотивности, медиаобраз муниципальной власти, деструктема, конструктема.

Introduction

The growing media activity of public authorities at the local government level makes it urgent to investigate the communicative types of municipal employees in the public information space, which affects the perception of municipal authorities by the discursive community. As municipalities independently implement activities on issues of local importance [Zavarzina, 2022; Mityagina, Novikova, Vankova, 2019], reliable information from official municipal sources is vital for discursive communities because they make management decisions relying on the information provided by the authorities. It was not until the early 20th century that sociologists began discussing the need to distinguish between local and regional authorities [Golovina, 2008; Tyurikov, 2020; Van, Karabulatova, 2024]. While discursive representations of regional government representatives have been described several times [Okolyshev et al., 2022; Yudina, Kotlyarova, 2019], municipal government discourse needs to be examined in depth.

In most studies, researchers describing the communicative perspective of government structures focus on the communicative types that are negatively evaluated due to such preconceptions as 'the municipal employee is a corrupt official', 'the municipal employee is a crook', 'the municipal employee is a boor', 'the municipal employee is a fool', 'the municipal employee is a buffoon', etc. [Postnikova, 2010]. As pointed out in [Alyakrinskaya, 2009], blaming the authorities has become a common trend in the context of the democratic tradition adopted from the West by Russian culture. However, there are papers focusing on the positive communicative types such as: 'the municipal employee is an honest executor of the law', 'the municipal employee is an understanding father', and 'the municipal employee is a guardian'. These varieties of the communicative type of 'municipal employee' have been identified by us for the first time [Okolyshev et al., 2022]. At the same time, it is worth noting that the type of 'municipal employee is a knight without fear and reproach' was highlighted earlier [Alyakrinskaya, 2007].

The perception of authorities in Russian-language consciousness is inspired by Russian classical fiction, which portrays several communicative types of municipal employees, those presented in the play *The Inspector* by N.V. Gogol, the novel *The History of a City* by M.E. Saltykov-Shchedrin, the short story *The Man in the Case* by A.P. Chekhov. Later, the communicative characteristics of the municipal employee were reflected in the novel *Generation "P"* by V. Pelevin, the novel *Labyrinth of Reflections* and the cycle *Watches* by S. Lukyanenko. Media discourse employs and disseminates the imagery of officials developed in the literary tradition. Thus, the communicative type of Derzhimorda, originally a character in the play *The Inspector* by N.V. Gogol, defined as a "dumb performer of rude power; A rude and domineering administrator using police methods" [Derzhimorda], is represented in the newspaper headlines "A couple of phrases: 'A polite state'. Moscow power vs Derzhimorda" (Rudensky); "The derzhimordy are building us a cultural barracks" (Derzhimordy stroyat...). Pompadours and woman's-pompadours (*pompadourshi*) are the common name of autocratic officials, bureaucrats and their wives or favorite mistresses. It originated in the satirical cycle of *Pompadours and woman's-Pompadours* by M.E. Saltykov-Shchedrin. The model for the writer was the figure of the Marquise de Pompadour, the favorite of the French king Louis XV, an analogy with the word '*tyrant*' [Rossiyskiy gumanitarnyy...]. Still, in media discourse, this image persists on describing the negative communicative type of the municipal employee: "Pompadury i pompadurshi rossijskoi vlasti" (Pompadury i pompadurshi...). These deeply rooted in the minds of Russian language speaker's images influence the perceptions of authorities unconsciously.

Thus, due to the classical literary tradition and media coverage often employing negatively evaluated literary imagery well-known to the Russian-speaking discursive community, the public discourse representation of municipal and state employees has shaped an ambivalent but mostly negatively skewed attitude towards government representatives in the modern Russian public consciousness. The data obtained during the polls by the Public Opinion Foundation in December 2020 showed that: a) 45% of respondents feel contempt for officials of any level; b) 69% of respondents feel envy, considering the prestigious social position of an official. However, 55% of

respondents said they would not like their children to work in public and municipal administration. Only 1% of respondents said that they sympathized with officials because they have a challenging job, and 25% indicated that the concepts of 'official', 'civil servant', and 'municipal employee' evoke pronounced negative associations. It should be noted that the respondents called the communicative type 'corrupt official' the most common in all government structures (Rozhkova, Vinokurov).

To date, developing variable approaches to the harmonization of public relations within municipal-territorial entities, which fits well into the designed structures and schemes [Bitkeeva, Kirilenko, 2023; Gorban, Kosova, Sheptukhina, 2021], requires research into media communication of authorities with the focus on compiling a register of information tension points in the media space. The practical issues can include developing guidelines on the management of public discursive reactions in society, intended for students of political-administrative and political-management since the existing ones do not give any recommendations for how to negotiate in public space [Chekmenev, Astvatsaturova, Solovyova, 2022].

The study relies on the previously developed linguistic concept of the communicative type [Karasik, 1996; Pospelova, Shustrova, 2015], which seems promising for analyzing public coverage of the municipal activities. We believe that the effectiveness of the municipal government can be evaluated through observations of the communicative activity of municipal authorities. The issue of information retrieval and processing using technological solutions requires interdisciplinary research [Karabulatova, Zhang, 2024; Okolyshev et al., 2022; Piotrovskaya, 2023].

Due to the task urgency, the research team solves the following wet blocks of questions:

1. Identification of communicative varieties of the 'municipal employee' type; development of a system for automatically determining sentiment based on the selected varieties of the communicative type; determination of tension points between texts from various sources representing municipal government based on automatic analysis of tactics.

2. Providing reliable data from the proposed information and analytical system for assessing moods from texts with forecasting the impact on

the development of personality, society, language and culture in the region. Identification of the parameters of social engineering that correlate with the parameters of determining the viability of a 'small homeland', language, society and the state. Clustering of the parameters of the 'core' of human self-identification,

3. Developing ways to level the effects of the 'path of attraction' in highlighting communication problems between the municipal government and society. Instructions for promoting improved communication in the 'municipal government – people' system. Identification of the degree of influence of bureaucratic language on the evaluative perception of municipal government.

Materials and methods

This study develops a methodology to automatically assess the communicative type of 'municipal employee' represented in the public information space and define the effectiveness of using the communicative potential of municipal authorities based on the synergy of classical and computational linguistics [Gorban, Kosova, Sheptukhina, 2021; Karabulatova, Vorontsov, 2019].

Based on the term 'communicative type' developed within the framework of the Volgograd Linguistic School [Karasik, 1996; Pospelova, Shustrova, 2015; Volkova, Panchenko, 2022], the proposed methodology uses provisions of general theoretical, applied and comparative linguistics, and expertise in economics, state and municipal management, jurisprudence and sociology, as well as machine learning methods [Gapanyuk et al., 2024; Chekmenev, Astvatsaturova, Solovyova, 2023; Kolmogorova, Kalinin, Malikova, 2019; Vorontosov et al., 2022].

The research materials comprise printed media texts and texts retrieved from open official sources by the municipal governments of the Moscow region, including official thematic groups of municipalities hosted on the platforms *VKontakte, Odnoklassniki*; official websites of public collegial governing bodies; official municipal media sources. The research team of machine learning and semantic analysis of the Institute for Advanced Research of Artificial Intelligence and Intelligent Systems of Lomonosov Moscow State University conducted machine learning using news samples of narratives about the activities of

municipal authorities. The experts analyzed the texts and highlighted the parameters, after which these texts were sent for machine learning. Using a continuous sampling method, in total, 2,500 news reports covering the period from 2018 to 2023, which contain a positive, neutral and/or negative assessment of the considered communicative type, were collected and analyzed.

The study makes use of the assumption that in cognitive and structural-semantic perspectives, in media discourse, communicative types of municipal employees form an independent complex of *constructemes* and *destructemes*, verbal, paraverbal and non-verbal means, varied in typological features of *manipulatives* [Karabulatova et al, 2023].

The term 'destructeme' denotes a verbal means complex with the negative emotive stance of destruction associated with aggression, anger, punishment, criminal activity, etc., which causes an internal dramatic conflict in the recipient. The term 'constructeme' denotes a verbal means complex with the positive emotive stance engaging the recipient in a harmonious relationship with himself and the world.

We also focused on text reviews written by municipality residents to identify specific features of the communicative type 'municipal employee' that set a particular mood [Ngoc, Thi M.N, Thi N.H., 2021].

In this regard, a sentimental analysis of the texts was carried out to represent the communicative type of 'municipal employee'. Taking into account the content, emotional attitude and communicative strategies [Lukashevich, 2022, pp. 54], the study included 1) checking the subject of tonality; 2) checking the object of tonality; 3) detection of the tonal assessment [Bolshakova et al., 2017].

Automatic sentiment detection includes two groups of methods: 1) engineering and linguistic methods [Karabulatova, Vorontsov, 2019; Kolmogorova et al., 2019]; 2) methods based on machine learning [Gapanyuk et al., 2024; Wankhade, Rao, Kulkarni, 2022].

Engineering linguistic methods are based on the use of traditional lexical methods, which are in the focus of rule-based approaches (rule-based approach) and lexicographic approaches (dictionary-based approach). The use of these methods is due to the following logic in the work: 1) the identification and nostrification of emotive vocabulary, which is based on compiling a dictionary of the subject emotive vocabulary of

the conceptual space under consideration; 2) automatic identification of evaluative definitions of communicative strategies of representatives of municipal authorities is implemented by drawing up instructions, which contain a pool of linguistic, communicative-contextual, logical rules so that it is possible to determine the tonal assessment of a text fragment.

For this purpose, generally accepted dictionaries of evaluative vocabulary, dictionaries of antonyms and synonyms, dictionaries of emotions, and explanatory dictionaries that are translated using a machine method are used [Lukashevich, 2022, p. 148].

The rules set by our instruction pursue finding correspondences with the well-known logical model 'if (...), then (...)'. These steps are taken at the stage of determining the overall tonal assessment of the text segment. At the same time, an additional mandatory analysis is carried out to identify the occurrence of a word in a particular set of evaluative semantic spaces. So, for example, the researchers point out that if the chain contains a verb from the list (*to love*, *to like*, *to adore*, etc.) and does not contain a verb from another list (*to terrify*, *to disgust*, etc.) or negation, then its tonality is positive [Nikolaev et al., 2016]. Further, the identified estimates, which are important for determining the communicative type of 'municipal employee' in subsequent calculations of the social and communicative potential of communicative power in the public space, are summarized, after which the total sum of the weights of communicative importance and emotivity for one or another analyzed text fragment is determined.

Detecting the sentiment of a text automatically by using machine learning methods is traditionally considered a recognized classification task [Kotelnikova et al., 2022; Zhang, Gan, Jiang, 2014], which uses the support vector machine (SVM) method [Bolshakova et al., 2017], logistic regression and gradient boosting [Nguyen et al., 2018], as well as a naive Bayesian classifier [Parween, Pandey, 2016].

It should be recognized that the use of both groups of methods is due to the specifics of the subject area under consideration, since the inherent multidimensionality and complexity of the internal structure of social and communicative skills cannot be solved only by machine learning

methods, however, recent research is moving towards automating the analysis of communicative situations and their emotional impact on both participants in the communicative process and passive observers [Kolmogorova, Kalinin, Malikova, 2019]. In addition, the choice towards automating the identification of typological markers of the communicative type 'municipal employee' and the positioning of the activities of municipal authorities is also due to the need to distinguish strategies for discrediting power and reasonable criticism.

The abundance of the communicative type 'municipal employee' representation is diverse in the subject of the plots, in the ways of presenting information, which creates difficulties for creating an objective assessment system based on machine learning [Lukashevich, 2022]. At the same time, the use of linguistic-and-engineering approaches demonstrates the speed of processing and fairly easy interpretability, regardless of the volume and quality of the initial sample [Zhang, Gan, Jiang, 2014]. In this regard, the idea of developing tonality analysis systems towards hybrid models seems promising, because it leads to a multi-paradigm approach usage [Birjali, Kasri, Beni-Hssene, 2021; Zhang, Gan, Jiang, 2014].

The analysis of the works on the research topic allows us to formulate the task for automatic modeling of the following values: 1) verification of the communicative behavior of municipal employees; 2) verification of the 'municipal employee' typology; 3) assessment and prognostication of public attitudes in the perception of the public realization of the communicative type 'municipal employee'; 4) selection of research approaches relevant for the application of digital tools in the assessment of social communication, in particular, the tools and algorithms used for text processing; identification of communicative types of municipal employees establishing features of their behavior and communication patterns. A clear statement of these values will make the methodology designed in this study applicable for some further studies.

The process of calculating the emotional and communicative potential of municipal entities in relation to various communicative types is divided into several stages, each involves the solution of specific tasks.

Stage 1 entails the analysis of source text documents related to municipal administration, employing multiple coding systems, including verbal, non-verbal and paraverbal codes. Each of these codes requires a separate set of instructions for automated character recognition. At Stage 2 of the comprehensive analysis, the attention is focused on the syntactic examination of the textual material, encompassing both a detailed analysis of the document itself and the identification of concepts and relationships, as well as the creation of a metagraph-based structure of interconnections. At Stage 3, the developed model structure is formalized, serving as a repository of concepts within the municipal management domain. At Stage 4, a straightforward model refinement was executed on the findings from the previous phase. Stage 5 represents a sophisticated conceptual modelling approach that enables a nuanced examination of the perceptions of municipal governance among diverse social segments, enriching them with hypertextual data.

This process encompasses the resolution of interconnected challenges pertaining to conceptual transformation and the transition from a destructive mindset to a more constructive one.

The very task of identifying the text as belonging to the lexical and semantic space 'municipal administration' uses the traditional formalization model, which was applied to the automatic verification of other lexical and semantic classes [Nikitin, 2022, pp. 41-42]: let ΣI – an unstructured text information resource; $\Sigma = \{M_0, M_1, M_2 (...), M_k\}$, where M – this is a fixed number of classes of 'municipal employee', M_n – [n] is an indication of the number of the base group of the semantic space 'municipal government'. At the same time, the designation [n] refers to the number of main topics previously identified by experts related to the coverage of the activities of municipalities. At the same time, C is considered as a multi-valued and universal function, the sign itself denotes an abbreviation of the first letter: C-classification. Therefore, the creation of the classifier C is based on the analyzed volume of texts on municipal management with the allocation of specific classes:

$$C: X' \rightarrow M,$$

At the same time, C is considered as a multi-valued and universal function. Based on this, a text information resource is designated under the WC′ (word of classification) sign,

which has a simultaneous correlation with several classes of M_n.

However, unlike the work by M.Yu. Nikitin [2022], the content of the constructemes and the destructemes of the municipal government is different, because it is aimed at reflecting the content of municipalities. Thus, the classification of textual information in the conceptual space 'municipal government' is based on a variety of linguistic indicators of a binary nature (destructeme and constructeme) (Table 1).

The register of destructive topics related to public coverage of the activities of the municipal government includes 341 clusters. Thus, the indicator $N = 341$. The number of classes is allocated through distinguishing potentially dangerous topics that have a negative impact on the coverage of the life of municipalities [Karabulatova, 2020]. Binary is the conjugacy of each class of destructive objects with corresponding classes of constructive orientation opposite to them. At the same time, the M_0 – class of a neutral assessment without the content of the assessment is singled out separately.

In general, monitoring the image of municipalities is the result of the development of technology that utilizes the communicative types of municipal employees as the basis for automatic identification of information threats from detractors [Evtushenko, 2017; Shirinkina, 2020; Zavarzina, 2022].

Results

The study highlighted the significance of lexical units related to the concept of 'municipal government' in the linguistic landscape of the public information sphere. In municipalities, communication types constitute a diverse system of territorial communication positions within regional governance, each possessing unique characteristics.

Due to the fact that the municipality is a complex hierarchical structure, the upper level of its architecture is modeled by clusters. Next, the nature of interaction between the main clusters in the system at the public level was modeled. In turn, these large clusters are also complex metagraphs that form an extremely complex architecture of a hybrid-type metagraph system [Gapanyuk et al., 2024]. The main clusters of communication strategies of municipal authorities, which are implemented in the modern public space, also represent graph structures in modeling the activities of the municipality (Table 2).

This cluster system has a dynamic character, due to which the entire hierarchically constructed architecture of large semantic spaces of metagraphs is reproduced, it has a complex organization of interaction both within each metagraph and between different metagraphs, which forms new unities in the form of a complexly organized system of multimetagraph structure [Gapanyuk et al., 2024]. Thus, it can be assumed that the extra complexity of the interdependent communication links, that

Table 1. **A fragment of the rubricator of linguistic indicators of the 'municipal administration' space**

Class	Destructeme	Constructeme	Methods
M_0	no	no	lexicographic
….	…..	…	…
M_2	formalism, stationery	official-business individual style	M´ - machine learning
M_3	excess of power, hedonism, promiscuity, permissiveness	following the "letter of the law", restraint, modesty, politeness	M´ - machine learning
M_4	features of defiant, antisocial behavior, deviation	traits of socially approved behavior, empathy, hobbies (sports, singing, playing music, dancing, painting, etc.), involvement in the affairs of the municipality and the life of territorial entities	M´ - machine learning
M…	….	….	…
M_{35}	The language of passive and active aggression: ignoring, formal responses, insults, obscenities	The language of support and Russian speech elite culture: literacy, respect, complementarity, elitism, personality-oriented responses, "live" speech	M´ - machine learning + M´´ - working with dictionaries + M´´´ - expert assessment
M…	…..	…	……..
M_{281}	Destructive implicatures	Constructive implicatures	M´´´ - expert assessment

represent the activities of modern municipalities in the media space, can be characterized as a complex multilevel mechanism of the information empire.

The automatic algorithm we created for highlighting the main topics related to the emotive implementation of a positive/negative image of the 'municipal employee' type revealed the following components of the main thematic groups: 'Events' (33%), 'Social issues' (26%), 'Development' (22.5%), 'Actions' (8.5%), 'Law' (4.5%), 'National and religious concepts' (2%), 'Management problems' (2%), 'Corruption' (1.5%) (Fig. 1). These thematic groups reveal pronounced points of information tension that form an evaluative perception of the actions of municipal authorities. Points of information tension in reflecting the activities of municipalities can be expressed by the location of information (user comments on information on official websites of municipalities, information portals of municipalities, mass media texts on official websites with comments from readers, official pages of municipalities on social networks, etc.). According to the internal content, the critically important for residents' problems of municipalities can be concerned as pointing to information tension.

Our findings revealed that the lack of trust in information arises from a breach in the equilibrium of emotional vocabulary, as the overuse of highly evaluative language, irrespective of its tonality,

Table 2. **Clusters of constructive and destructive communication strategies for implementing the work of municipalities in an open public space**

Communication strategies of the municipality	
A constructive strategy for the development of municipal territorial education in the public discourse of representatives of municipalities	A destructive strategy for the development of municipal territorial education in the public discourse of representatives of municipalities
A cluster of positive communication strategies related to the full and effective use of the municipality's agricultural ties	A cluster of negative communication strategies caused by unfavorable conditions and inefficiency in using the agricultural potential of the municipality
Cluster of constructive communication strategies of the municipality in public coverage of innovations	A cluster of destructive communication strategies of the municipality caused by socio-economic overproduction and inhibition of innovation
A cluster of positive communication strategies that publicly highlight the sphere of trade, services and transport in the municipality	A cluster of negative communication strategies related to public coverage of problems in the field of trade, services and transport in the municipality
A cluster of positive verbal markers of urbanization and improvement of the standard of living of the population in a municipal territorial entity	A cluster of verbal markers indicating the social stratification of society, the shortage of human resources, and the aggravation of social relations within the municipality
A cluster of positive verbal parameters modeling an optimistic view of the future development of a municipal territorial entity	A cluster of negative verbal markers indicating inflation, stagnation, and a shortage of budget funds for the development of a municipal territorial entity
A cluster of positive verbal markers in the public discourse of representatives of municipalities regarding the coverage of industrial infrastructure issues on the territory of a municipality and the interaction of municipalities with the management of industrial production	A cluster of verbal public markers in the speech of representatives of municipal authorities indicating an increase in criminality, a decrease in security, and a decrease in the quality of life of the population living in this municipal territorial formation
A cluster of verbal positive markers indicating the tourist attractiveness of a municipal territorial entity (climatic advantages, expanded services, historical complexes, etc.)	A cluster of negative verbal parameters indicating the depressiveness of the municipality, containing indications of the inaction of the authorities in connection with the negative impact of production in the municipality on the environment, deterioration of climatic conditions and reduction of biodiversity
A cluster of positive verbal markers in public messages from municipal authorities about the growth of "smart" management of the territory, improving the quality of life in the specified municipality, improving communication between the municipal government and the population (such as the "Active Citizen" program, etc.)	A cluster of negative verbal markers in the public discourse of municipal authorities, indicating an increase in the criminogenic situation in the municipality, a decrease in the quality of life of the population, lack of feedback in communication between municipal authorities and the population, constant and forced intervention of the mass media and high management to solve municipal problems

disrupts the harmony of comprehension, compelling the recipient to focus more on unverified information such as rumors, propaganda, and fabricated content. As a rule, this information is found in user comments, on social networks, and in references to unoffical sources of information. Sometimes official media can also act as sources, which use openly manipulative information (such as: '*as it became known from our closed sources...*', '*as reported by some eyewitness of the event ...*', etc.). Such presentation of information by the well-known social mechanism of rumors stirs the most variable interpretation and dissemination.

Simultaneously, the actions of municipal authorities fail to elicit a favourable response from the intended audience, as there is a marked discrepancy between the "glamorous" portrayal of municipalities in media discourse and the quality of communication with the local Internet users. As a rule, the "glamorous" image is presented on the official portals of municipalities. At the same time, the negative image of municipalities is common on official media sites, focusing on unresolved problems and/or the lack of solutions. As a rule, the municipality representative's image evaluation is clearly manifested in the comments of users. This discrepancy is evident in the contrast between the public exposure of various misconduct committed by municipal officials against ordinary citizens and the image of

municipal authorities presented on official municipal websites (Fig. 1).

As an information target in the news media discourse, the municipal employee appears in two guises: 1) external, displayed in his actions; 2) internal, presented in the comments of the publication reflecting their authors' knowledge, beliefs and values.

When construing the communicative type of the 'municipal employee' concept, most media texts depict it as a subtype of 'competent expert' (80%). However, in the comments, Internet users tend to highlight the failures of local authorities in solving complex socio-economic problems that indicate distrust toward government representatives.

Expressive assessments of the activities of municipal employees accentuated the negative attitude in the designation of many negative communicative types such as 'derzhimorda', 'insensitive boor', etc., forming the communicative type 'aggressor'. Such assessments are typical for the mass media. Although this type comprises only 15% of news publications, it dominates in the perception of municipalities by internet users due to the brightness of the communicative features. Only 5% of publications about the municipal government represent the communicative type 'municipal employee – codependent', which, in fact, is much more common in real life. A native Russian speaker designates this communicative type through such images as 'scribbler', 'man in a
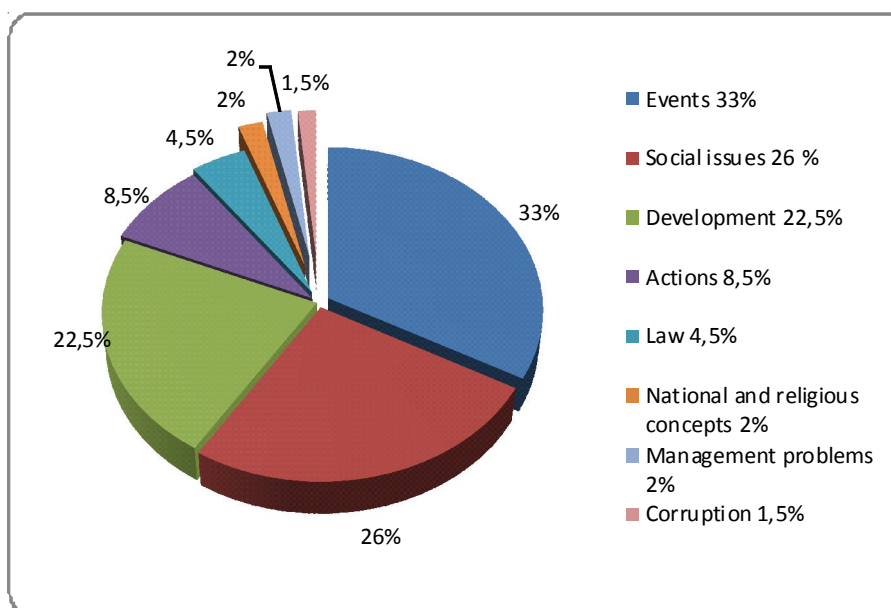
Fig. 1. Thematic groups of the concept 'municipal power'

case', 'wise minnow', 'little man', etc. Such assessments are typical both for mass media publications and for user comments in the comments.

At the same time, each of these three communicative subtypes of the municipal employee concept is presented with two communicative strategies. The first strategy is externally image-based, reinforcing a certain 'sacred aura' of power in Russian realities, which is actively used in media discourse. The second strategy is related to the recording and broadcasting "live communication" between representatives of municipal authorities and the population (such as "direct line" broadcasts on local TV channels, "live microphone" and streaming with representatives of municipalities on radio channels, etc.), which makes it possible to present the communicative type of "municipal employee" in imitation direct communication. Thus, ordinary citizens naturally develop a sense of danger and distrust of government officials.

In this regard, regardless of the three main communicative types of municipal employees (*competent*, *dependent* and *aggressive*), five typical communicative tactics (types X) were identified in the media discourse on municipal government: *greed*, *fraud*, *emotional coldness*, *obscenity*, *promiscuity*. The prevalence of each tactic for a specific communication type is shown in Fig. 2.

The frequency of occurrence of these tactics is represented on the vertical coordinate axis as a percentage, which gives grounds to assert that the media discourse reproduces an established negative stereotype in the representation of local authorities. Thus, the communicative type 'competent expert' (indicated in the diagram as *competent*) in the media discourse most often demonstrates greed (80%), while less often uses fraud (40%), which fluctuates with the use of emotional coldness (33%) and obscenity (32%), promiscuity (30%).

The communicative type of municipal employee, indicated in the diagram as *dependent*, is positioned in media publications with similar priority communicative characteristics: greed (80%), fraud (65%), emotional coldness (20%), and obscenity (20%), promiscuity (18%).

Compared with the competent and dependent communicative types, the aggressive communicative type of the municipal employee is much less common in the mass media. However, it has the striking features of an information target, which can already be an information guide in the media. At the same time, the representation of similar tactics for this communicative type looks like this: greed (19%), while less often uses fraud (10%), emotional coldness (9%) and obscenity (7%), promiscuity (8%).

By emphasizing the negative aspects of the municipal authorities work, the media force municipal employees to adopt destructive communicative tactics, which are dominant in the positioning the municipal communicative types.
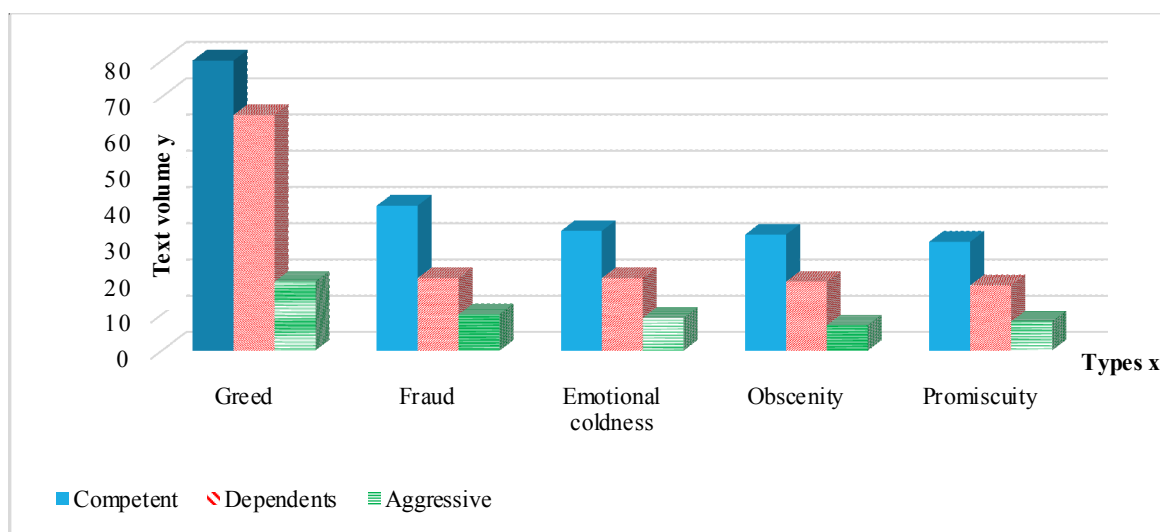
Fig. 2. The representation of destructive traits in the communicative tactics
of three communicative types of municipal employees in the public media discourse

Consequently, the discursive community perceives any local authority initiative negatively, which requires long-term and extensive work to build trust and a desire for cooperation among the target audience.

To a great extent, the prevalence of negatively coloured content in the media coverage of the municipal government performance reflects the media preference for shock content, ignoring the successes and achievements of municipal authorities (Fig. 2).

The development of technology for monitoring and forecasting public threats based on "soft power" methods [Barabash et al., 2019], by identifying the communicative types of current municipal employees, can help municipalities and regional authorities achieve the desired results to ensure territorial identity.

Conclusion

The presented work demonstrated the route on developing a methodology in the humanities for effective and comprehensive automation of the subject area that enables research on distinguishing communicative types with higher accuracy. The suggested technology of monitoring information about urban districts municipalities' performance of the Moscow region based on "soft power" methods enabled identification of evaluation characteristics for the concept "municipal employee".

The results obtained confirm that municipality employees' communication types are constructed with both negative and positive public assessment, being competent, dependent or aggressive types. The positive assessment is associated with competence and efficiency, the media description of efficient activities is aimed at demonstrating intention to meet the needs and expectations of the citizens. However, negative facts may be used to diminish the image of the municipal employees in local public media, presenting them as being greedy, emotionally cold, obscentive, insensitive. The automation methodology combined with the sentiment analysis of assessment helped to represent such polarization in municipal employees' public images and distinguish several communication tactics, in particular, destructive media preference for shock content, that ignore the success and achievements of municipal

authorities, which requires long-term and extensive practice to build public trust and stir a desire for cooperation among local authorities and citizens.

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POTENTIAL OF MACHINE TRANSLATION IN MUSEUM MEDIA DISCOURSE: ANALYSIS OF MODERN BROWSER SYSTEMS

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Abstract. The article is devoted to the actual problems of neural machine translation optimization, which are caused by the inclusion of multilingualism in the functionality of online resources for providing equal access to information for all users. The results of analyzing the machine translation of English-, German- and French-language content of museums' media discourse into Russian are based on the usage of built-in browser systems from Yandex, Google and Microsoft. The selection of fragments for comparative analysis is carried out taking into account the random choice of the source language by users. The functional capabilities of machine translation systems, optimized by neural network technologies, are viewed as denotative equivalence provision, correct transference of the majority of proper names and adequate actualization of the lexical units meanings with their reference to the context. Several cases stated that browser-based translators used correspondences without taking into account the context, linguacultural tradition, pragmatic meaning of language units, which demonstrates the limited capabilities of these systems to create an adequate, stylistically and discursively designed translation. It is established that the greatest difficulty lies in the translation of isolated nominations (section names, language selection buttons, etc.), which indicates a high level of artificial intelligence involved in machine translation systems, that imitate humans in their mandatory desire to obtain a context that actualizes the meaning of a word.

Key words: neural machine translation, artificial intelligence, multilingualism, browser-based automated translation systems, museum media discourse.

ПОТЕНЦИАЛ МАШИННОГО ПЕРЕВОДА В МЕДИАДИСКУРСЕ МУЗЕЕВ: АНАЛИЗ СОВРЕМЕННЫХ БРАУЗЕРНЫХ СИСТЕМ

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ПОТЕНЦИАЛ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

Аннотация. Статья посвящена актуальным проблемам оптимизации нейронного машинного перевода, которые обусловлены включением многоязычия в функционал онлайн-ресурсов. Описаны результаты анализа машинного перевода англо-, немецко- и франкоязычного контента медиадискурса музеев на русский язык с применением встроенных браузерных систем от Яндекс, Google и Microsoft. Выбор фрагментов для сравнительного анализа осуществлялся с учетом рандомного предпочтения исходного языка пользователями. Определено, что функциональные возможности систем машинного перевода, оптимизированных нейросетевыми технологиями, в основном обеспечивают его денотативную эквивалентность, корректно передают большинство имен собственных и адекватно актуализируют значения лексических единиц с опорой на контекст. Выявлены ситуации, когда браузерные переводчики используют соответствия без учета контекста, лингвокультурной традиции, прагматического значения языковых единиц, что демонстрирует ограниченные возможности этих систем создавать адекватный, стилистически и дискурсивно оформленный перевод. Установлено, что наибольшую сложность представляет перевод изолированных номинаций (названий разделов, кнопок выбора языков и т. п.), что свидетельствует о высоком уровне задействованного в системах машинного перевода искусственного интеллекта, имитирующего человека в его обязательном стремлении получить контекст, актуализирующий значение слова. В.А. Митягиной предложена концепция работы и дана общая характеристика актуальных исследований нейросетевого этапа развития машинного перевода, А.А. Новожиловой проанализированы англо- и немецкоязычные публикации по машинному переводу и контент Пергамского музея, А.П. Наумовой – публикации на французском языке и контент Музея Орсе.

Ключевые слова: нейронный машинный перевод, искусственный интеллект, многоязычие, браузерные системы автоматизированного перевода, медиадискурс музея.

Введение

В современном мире искусственный интеллект (далее – ИИ) играет ключевую роль во многих сферах деятельности общества, различные автоматизированные системы повсеместно используются как на бытовом уровне, так и в профессиональных областях. Весьма активно технологии ИИ задействованы в переводе: создаются и активно внедряются комплексные системы автоматизированного перевода, которые реализуют технологии переводческой памяти, статистического анализа текста, проверки качества, а также инструменты управления терминологией и системы машинного перевода. Всего несколько лет назад качество автоматического перевода, выполняемого, прежде всего, веб-сервисами на основе технологий машинного перевода, резко улучшилось, и короткая эпоха шуток и анекдотов, рожденных онлайн-переводчиками, закончилась. Актуальные возможности веб-переводчиков позволяют не только понять общее содержание оригинала, но и получить относительно адекватный текст. Оптимизация автоматического перевода связана с успехами в области искусственных нейронных сетей и искусственного интеллекта в целом. Вычислительные возможности суперкомпьютеров в сочетании с Большими данными (Big Data) реализуют идею, рожденную в 1940-е гг.: соединить многомиллиардную систему искусственных нейронов, аналогичных клеткам человеческого мозга с высокими мощностями ЭВМ. Отметим, что «глубокое обучение» (Deep Learning) как подход к «тренировке» нейросетей, придал динамичную, экстенсивную форму программам машинного перевода, которые изначально строились на заданных правилах трансформаций единиц исходного языка и языка перевода, использовании их структур и правил. Появились перспективы «вывести принципы, которые позволят нейронным сетям имитировать нейролингвистические процессы» [Дукальская, Бараковская, 2022, с. 90].

Сегодня нейронный машинный перевод активно применяется в различных программах и сервисах, таких как переводчики в мобильных приложениях, онлайн-переводчики для веб-страниц, голосовые помощники с функцией распознавания речи и другие. Несмот-

ря на значительный прогресс в этой области, машинный перевод все еще далек от идеального и может содержать ошибки или неточности. Однако информативная функция нейросетевого перевода используется активно и широко: многие ресурсы, на которых доступен автоматизированный перевод, стали частью инклюзивности общества, предлагающего равные права и возможности всем включенным в актуальное социокоммуникативное пространство [Mityagina, Volkova, Walter, 2022]. Не-владение иностранными языками в информационную эпоху перестало быть глобальным барьером. Согласимся с Крюгером в том, что непосредственное общение без переводчика остается недоступным вне иноязыковых компетенций, но уже преодолена ситуация, когда человек, по меткому выражению Уорфа, заключен в тюрьму своего языка [Krüger, 2018].

Таким образом, можно говорить об обусловленном растущей глобализацией и взаимосвязанностью мира переходе от одноязычного к многоязычному ИИ, который формируется как большая языковая модель (Large Language Model, LLM). Эта модель использует алгоритмы машинного обучения, определяющие в пространстве больших текстовых данных вероятностное сочетание слов и их значения в заданном контексте. Сегодня основное применение LLM находят в поисковых системах, чат-ботах, в написании маркетинговых текстов, электронных писем, а также в устном, письменном, аудиовизуальном переводе.

Многоязычный ИИ становится решающим фактором для транснациональных компаний, позволяет им охватить более широкую аудиторию, предлагать поддержку клиентов на нескольких языках и выходить на новые рынки. Многоязычие стало «новым этапом развития коммуникации в веб-пространстве, который пришел на смену кратким периодам господства английского языка и становления сегментов Интернета на национальных языках» [Митягина, Наумова, Новожилова, 2023, с. 5].

Интерес к научному анализу технологий машинного перевода растет с каждым годом как среди зарубежных, так и среди российских ученых. Основные направления исследований в области программ машинного перевода включают обоснование алгоритма постредактирования машинного перевода [Волкова, 2021;

Popovich, Bortnikov, 2023], оценку его качества [Коканова, Поротова, 2023; Sennrich, Haddow, Birch, 2016; Knaus, 2023], сравнение переводов, созданных профессиональными переводчиками и машинными программами [Нарбут, Шерстнева, 2022; Кузнецова, 2020; Welnitzova, Jakubickova, Králik, 2021; Yonghui et al., 2016], описание и сопоставление статистических и нейронных программ машинного перевода [Мурзабекова, Алиев, 2020; Денисова, 2018], а также осмысление правовых аспектов применения машинного перевода. Лингвистическое и переводоведческое осмысление феномена многоязычного ИИ началось совсем недавно. В обзорной статье М.Б. Раренко представлено его поэтапное развитие [Раренко, 2021]. В работе «Искусственный интеллект в технологиях машинного перевода» авторы из ФИЦ Института управления (ИУ) РАН исследуют взаимосвязь машинного перевода с моделированием процессов понимания и генерации текстов на естественном языке и делают вывод о функционировании соответствующих переводческих программ в рамках грамматически согласованного перевода последовательностей слов [Колин и др., 2021]. В работе П. Константайна анализируется качество машинного перевода художественных текстов в системе Google Translate, в частности, его адекватность воспроизведения стилистических особенностей оригинала [Constantine, 2019]. Особое внимание уделяется изменению концепции перевода в контексте технологического развития и появлению новых ролей и компетенций переводчиков. Исследователи Р. Эсени, К. Беднарова-Гибова, Р. Эдина предпринимают анализ преимуществ и угроз искусственного интеллекта для лингвистов и предлагают теоретическая модель новых ролей переводчика [Eszenyi, Bednárová-Gibová, Edina, 2023]. Ш. Кастило и ее коллеги описывают разнообразные подходы к оценке качества машинного перевода и указывают на необходимость дополнительных методик для решения актуальных проблем в практике перевода [Castilho et al., 2018].

Разноплановый характер исследований ИИ в аспекте перевода связан со сложностью феномена ИИ во всех его проявлениях: нейросетевая программа перевода являет собой искусственный мозг, самостоятельно создающий текст перевода на основе огромного массива доступных

данных, однако зачастую результат может не соответствовать оригиналу в полной мере, потому что естественные языки плохо поддаются абсолютному раз-, де- и перекодированию.

Следует отметить, что скорость развития нейросети увеличивается в геометрической прогрессии, и исследования не успевают за этим бурным развитием, которое является ответом на растущий объем контента, требующего не только перевода на множество языков, но и лингвокультурной и прагматической адаптации в условиях ограниченного времени. Автоматизация процесса перевода, позволяющая ускорить его выполнение, становится неотъемлемой частью работы переводчиков во многих профессиональных сферах. В связи с этим важно исследовать передовые технологии нейронного машинного перевода, включая оценку качества перевода, выполненного системами искусственного интеллекта с использованием усовершенствованных нейросетевых алгоритмов (например, Promt Neural, ChatGPT, Cloud Translation API, Яндекс Переводчик, DeepL, Google Переводчик, Microsoft Translator), а также изучение способности этих систем к самоисправлению в процессе обучения или по запросу об исправлении ошибок.

Наряду с этими позитивными процессами использование ИИ в общем и машинных переводчиков в частности в сферах, предполагающих присутствие творческого и интеллектуального потенциала человека, к которым относятся тексты музейного медиадискурса, накладывает некоторые ограничения: существуют опасения, что использование многоязычного контента путем его задействования в генерировании текста создает как риск плагиата, так и возможность мультиплицирования ошибок (см. о ней: [Knaus, 2023]).

Настоящее исследование посвящено изучению работы нейронных систем машинного перевода в пространстве медиадискурса, его актуальность определяется широким использованием сервисов машинного перевода для перевода контента веб-сайтов как разработчиками, так и пользователями, особенно с учетом сложности и высокой стоимости создания локализованных версий. Лингвистическое, транслатологическое осмысление информационно-технологических новаций в сфере пере-

вода соответствует Национальной стратегии развития искусственного интеллекта в Российской Федерации до 2030 г., которая предусматривает повышение квалификации специалистов различных отраслей, что требует разработки и актуализации научных представлений о системах искусственного интеллекта в этих областях. Кроме того, улучшение информационно-коммуникационных технологий способствует формированию новых социоэкономических и социокультурных моделей, обеспечивая равный доступ граждан к многоязычным интернет-ресурсам, что особенно важно в условиях глобализации и интенсификации миграционных процессов.

Материал и методы исследования

Цель исследования – оценить возможности современных систем искусственного интеллекта на основе анализа результатов автоматического перевода текстов медиадискурса, что позволит определить текущий уровень развития машинного перевода, определить преимущества и недостатки для использования многоязычной аудиторией и способствовать дальнейшей оптимизации процесса машинного перевода.

Материалом послужил вербальный контент медиапространства музеев на немецком, английском, французском языках и его перевод-транслят на русский язык встроенными браузерными машинными переводчиками от сервисов Яндекс, Google, Microsoft, которые в настоящее время являются наиболее популярными автоматическими инструментами преодоления языковых барьеров. За единицу исследования принимались отдельные текстовые фрагменты, состоящие из нескольких предложений или номинативных единиц, обозначающих, например, названия рубрик или прочих иконок переключения на сайте.

Результаты и обсуждение

Информационный поиск, направленный на изучение сайтов памятников культуры, истории и архитектуры, музеев, выставок и других туристических достопримечательностей стал обязательной частью подготовки и организации путешествия. Версии на разных

языках предлагают многие крупные туристические интернет-порталы, посвященные городу или региону в целом, и потенциальные туристы не испытывают проблем с предварительным знакомством с заданной локацией, но могут рассчитывать лишь на общие сведения об имеющихся достопримечательностях. Сайты, посвященные отдельным объектам, зачастую ограничиваются языковой версией на родном языке и версией на глобальном английском, которая изначально в большинстве случаев создается при помощи автоматических систем перевода без привлечения профессиональных переводчиков. Создается ситуация коммуникативного неравенства для пользователей, не владеющих ни государственным языком страны, в которую они направляются, ни английским языком, и машинный перевод необходимого контента становится единственным способом преодолеть языковой барьер.

Сначала обратимся к контенту сайта одного из самых известных музеев Германии – Пергамского музея (Pergamonmuseum). Сайт представлен в двух языковых версиях – немецкоязычной и англоязычной, сопоставительный анализ которых позволяет констатировать, что текст на английском – это сокращенный, прагматически адаптированный под возможности глобального получателя перевод. В целях анализа машинного перевода на русский язык для сравнения отобраны фрагменты, совпадающие по содержанию в немецкоязычной и англоязычных версиях (пользователи могут самостоятельно выбрать одну из доступных).

Автоматические переводчики Microsoft Translator, Google Translate и Яндекс Переводчик быстро и без смысловых ошибок выполнили перевод, но результаты их работы различаются в синтаксическом, лексическом и стилистическом аспектах.

В сообщении об изменении графика работы музея с кнопкой для получения дополнительной информации на главной странице сразу видим:

Пергамский музей
(1) Bitte beachten Sie die geänderten Öffnungszeiten ab 16. April 2024. Mehr
(2) Please note the changed opening hours from 16 April 2024. More

Microsoft Translator
(1) Обратите внимание на изменение графика работы с 16 апреля 2024 года. Подробнее
(2) Обратите внимание на изменение графика работы с 16 апреля 2024 года. Больше

Google Translate
(1) Обратите внимание, что часы работы изменились с 16 апреля 2024 года. Подробнее
(2) Обратите внимание, что часы работы изменились с 16 апреля 2024 года. Подробнее

Яндекс Переводчик
(1) Пожалуйста, обратите внимание на изменение часов работы с 16 апреля 2024 года. Более
(2) Пожалуйста, обратите внимание на измененные часы работы с 16 апреля 2024 года. Еще

Приведенные примеры показывают, что все системы машинного перевода дают разные варианты для кнопки получения дополнительной информации (1) *Mehr* (2) *More*, передавая ее эквивалентами *Подробнее, Более, Больше, Еще*, из которых наиболее употребительным и контекстуально корректным для русскоязычных сайтов является вариант *Подробнее*. Остальные три эквивалента – контекстуальные аналоги, возможные в другом лексическом окружении. При сравнении переводов первого предложения с английского и немецкого обнаруживается полное совпадение переводов у переводчиков Google Translate и Microsoft Translator, а Яндекс Переводчик предложил для каждого языка свой вариант. Кроме того, переводчик Google допустил грамматическую неточность и выбрал глагол в форме прошедшего времени, хотя в момент проведения анализа (март 2024) речь шла о будущем времени и в оригинальных предложениях на немецком и английском языках на это указывают предлоги *ab* и *from*. Наиболее корректным из трех вариантов представляется перевод, предложенный Microsoft Translator, так как Яндекс использовал частицу *пожалуйста*, употребление которой в русском языке в подобных контекстах нетипично, в отличие от немецкого и английского языков. Опущение частицы вежливости *пожалуйста* при переводе двумя другими автоматическими переводчиками наглядно демонстрирует работу ИИ и анализ нейросетями данного контекста и сравнение его с подобными контекстами.

У всех онлайн-переводчиков возникли трудности при передаче сокращений, обозначающих кнопки переключения на доступные языковые

версии *DE* и *EN*. Так Яндекс при переводе с английского оставил эти сокращения без изменений, при переводе с немецкого предложил вариант *de / RU*, Microsoft использовал прием транслитерации *ДЕ / ЭН* для английского языка и *ЭН / ЭН* для немецкого языка, а Google выбрал латинские сокращения *RU / RU* для немецкого и *DE / RU* для английского. Сокращения *DE* и *EN*, являются общепринятыми для обозначения данных языков, но у автоматических переводчиков возникла путаница при их передаче, несмотря на то что другие широкоупотребительные сокращения переводчики перевели без ошибок. Например, сокращенные обозначения дней недели были переданы верно при переводе с обеих языковых версий всеми анализируемыми переводчиками, также система распознала немецкие сокращения *z.B.*, *bzw.*, *z.Z* и т. п.

Машинные переводчики зачастую допускают ошибки при переводе имен собственных, и предпринятый анализ дал этому наблюдению подтверждение. Фамилия современного немецкого художника иранского происхождения *Ядегара Азизи*, как показывает проверка в поисковых системах, передается в русскоязычных источниках при помощи приема транскрипции, согласно которому *s*, произносящийся звонко перед гласными, передается как *з*. Ни один из машинных переводчиков не перевел ее корректно. В большинстве случаев был использован прием транслитерации, в результате чего фамилия имеет написание *Асиси*, а переводчик Google при переводе с немецкого предложил в одном и том же тексте разные версии – *Асиси* и *Асизи*. Microsoft Translator использовал везде вариант *Асиси*, а в одном предложении при переводе с английского оставил оригинальное написание *Yadegar Asisi*. Такую нестабильность в передаче имени можно объяснить малой известностью этого художника в русскоязычном медиапространстве и тем, что нейросети еще не способны проводить тщательный поиск и анализ наравне с человеком. Однако следует отметить, что более известные имена собственные, например, *Геракл*, *Афина*, *Парфенон*, *Прометей*, *Адриан*, были переданы без искажения и в соответствии со сложившейся традицией их именования в русском языке.

Еще одной проблемой при автоматизированном переводе текстов музейного медиапространства оказываются иноязычные вкрапления из другого языка. Например, немецкие слова *Antikensammlung* или *Pergamonmuseum*, *das Panorama* в английском тексте, функционирующие как названия, остались при переводе либо без изменения на немецком языке, либо переданы транслитерацией и склоняются по правилам русского языка, что не способствует адекватному восприятию: *дас Панорама*, *Пергамский музей. Das Panorama*; *Уникальное партнерство между Антикензамлунгом Государственного музея Берлина*; *из фондов Антикенсаммлунга*; *с командой Antikensammlung*. Таким образом, можно утверждать, что при переводе искусственный интеллект с подключением одного языка не всегда может учитывать иноязычные вкрапления, автоматически распознавать их и для перевода обращаться к ресурсам на другом языке, что обычно делает профессиональный переводчик.

При анализе текстов-трансятов данного сайта выявляются синтаксические и стилистические нарушения, лексическая несочетаемость, эквиваленты, подобранные без учета контекста и т. п. В целом использование систем автоматического перевода может быть пригодным для информирования и формирования общего представления о музее. В текстах-трансятах довольно много примеров вполне корректных трансформаций:

Пергамский музей
(1) Das Panorama führt die Besucherinnen und Besucher zurück in das Jahr 129 n. Chr. und zeigt ihnen die antike Stadt Pergamon an der kleinasiatischen Westküste.

Microsoft Translator
(1) Панорама переносит посетителей в 129 год нашей эры и показывает древний город Пергам на западном побережье Малой Азии.

Пергамский музей
(2) Yadegar Asisi reconstructs the city as it was during the time of the High Roman Empire under the rule of the Emperor Hadrian (AD 117–138).

Яндекс Переводчик
(2) Ядегар Асиси реконструирует город таким, каким он был во времена Великой Римской империи под властью императора Адриана (117–138 гг. н.э.).

Пергамский музей
(3) In preparation for the show, the originals underwent extensive conservation and restoration.

This is especially true of the large statues of women from the courtyard of the Pergamon Altar, and the sculptures from its roof.

Google Translate

(3) При подготовке к выставке оригиналы подверглись обширной консервации и реставрации. Особенно это касается больших статуй женщин из двора Пергамского алтаря и скульптур с его крыши.

В приведенных примерах (1–2) нейронные машинные переводчики верно передали смысл, синтаксически и стилистически корректно оформили предложения – при таком соблюдении дискурсивных конвенций (нормированных правил создания текстов с использованием заданных языковых средств) получатель перевода может легко и без необходимости дальнейшей интерпретации воспринимать информацию.

Далее проанализируем работу искусственного интеллекта при переводе текстов медиапространства музеев с французского языка на русский на примере сайта Музея Орсе (Musée d'Orsay). Данное учреждение культуры является вторым по популярности после Лувра и входит в десятку крупнейших музеев мира. Сайт представлен в четырех языковых версиях: на французском, английском, испанском и итальянском языках. Исключение составляют разделы, ориентированные на «внутренних», французских посетителей и отсутствующие в переводе на иностранные языки. Данные информационные блоки в наше исследование включены не были.

Перевод на русский язык названий ключевых разделов сайта был осуществлен автоматическими системами неоднородно. Отмечается использование однозначных и вариантных соответствий, не искажающих исходное значение:

Музей Орсе
(1) LES COLLECTIONS
(2) VISITE
(3) RESSOURCES

Microsoft Translator
(1) КОЛЛЕКЦИИ
(2) ВИЗИТ
(3) РЕСУРСЫ

Google Translate
(1) КОЛЛЕКЦИИ
(2) ПОСЕЩАТЬ
(3) РЕСУРСЫ

Яндекс Переводчик
(1) КОЛЛЕКЦИИ
(2) ПОСЕЩЕНИЕ
(3) РЕСУРСЫ

В приведенных примерах названия двух разделов (1) и (3) были переведены с помощью эквивалентов: *коллекции* (1) и *ресурсы* (3), а номинация раздела (2), содержащего общую информацию о часах работы, местоположении и стоимости билетов, передана с помощью вариантных соответствий *визит / посещение / посещать* (2).

Иногда вариативность соответствий приводит к затруднениям в понимании текста:

Музей Орсе
(1) VOUS ÊTES
(2) AGENDA
(3) BILLETTERIE

Microsoft Translator
(1) ВЫ
(2) ПОВЕСТКА ДНЯ
(3) БИЛЕТНАЯ КАССА

Google Translate
(1) ТЫ
(2) ДНЕВНИК
(3) НАЧИСЛЕНИЕ ОПЛАТЫ

Яндекс Переводчик
(1) ВЫ
(2) ПОВЕСТКА ДНЯ
(3) ПРОДАЖА БИЛЕТОВ

Раздел (1) *Vous êtes* дословно переводится как «вы есть». В данном случае имеются в виду разные категории посетителей музея и специальные условия посещения для каждой из них. Очевидно, что все три системы машинного перевода выбрали дословный вариант без учета содержания раздела, название которого «живой» профессиональный переводчик перевел бы как *Посетителям*. Аналогичная ситуация прослеживается с единицей (2) *Agenda*, которая имеет следующие лексические значения: *повестка дня*; *записная книжка, ежедневник*. Однако ни один из указанных вариантов наряду с *дневником* не передает информации о предстоящих мероприятиях, хотя посвященный им раздел может быть номинирован в тексте перевода как *Выставки и события*. При переводе названия раздела (3) *Billetterie* (рус. *продажа билетов*; *билетная касса*) системой перевода Google

Translate допущена лексическая ошибка и выбран неподходящий контекстуально вариант (3) *начисление оплаты*, который может вводить в заблуждение посетителей.

На сайте Музея Орсе, как и на сайте Пергамского музея, возникли трудности при переводе кнопок переключения между языковыми версиями:

Музей Орсе
(1) FR
(2) EN
(3) ES
(4) IT

Microsoft Translator
(1) ФР
(2) В
(3) АР
(4) ОНО

Google Translate
(1) ПТ
(2) В
(3) ЯВЛЯЮТСЯ
(4) ЭТО

На странице сайта музея после перевода системой Яндекс Переводчик перестал отображаться список доступных языковых версий. Для приведенных примеров, представленных в системах Microsoft Translator и Google Translate, характерно следующее:

1) перевод сокращений (1–4) выполнялся с английского языка, несмотря на аутентичный язык сайта – французский, а также фиксированные буквенные сочетания, обозначающие языки мира в соответствии со стандартом ISO 639;

2) в двух случаях машинные переводчики передали «транскрипционный» вариант оригиналов. Например, единица (2) *EN*, указывающая на английскую языковую версию сайта, по-английски звучит как [ин]. При этом данный звуковой комплекс созвучен предлогу *in*, который переводится на русский как *в*. Таким образом, вместо варианта *Англ.* системой был выбран неверный «омофонный» вариант перевода *в*. В случае с испанской языковой версией сайта, обозначаемой единицей (3) *ES* и произносимой по-английски как [из], системы машинного перевода предложили неверный вариант *является* вместо *Исп.* Транскрипция [из] в английском соответствует глаголу-связ-ке *to be* в личной форме 2, 3 лица, единственного числа *is*, что переводится на русский как *является*, *существует*, *есть*;

3) в двух случаях использовались некорректные эквиваленты / вариантные соответствия: местоимение (4) *it* – оно / это, существительное (1) *FR – ПТ* (*пятница*). В одном случае правильный эквивалент *FR – ФР* (*французский*). Основания для варианта перевода *АР* установить не удалось, так как в английском языке отсутствует лексическая единица, которая переводилась бы таким образом.

Анализ перевода имен собственных свидетельствует о преимущественном соблюдении норм и правил перевода данной разновидности лексических единиц. Музей Орсе является одним из крупнейших собраний европейской живописи и скульптуры, поэтому проблем в машинном переводе имен известных художников, скульпторов не возникает: *Monet – Моне, Renoir – Ренуар, Edgar Degas – Эдгар Дега, Berthe Morisot – Берта Моризо*.

Несмотря на вполне приемлемое качество транслятов с французского на русский язык, ни одна из исследуемых систем нейронного перевода не обеспечивает качество перевода, полностью готового к опубликованию. Рассмотрим отрывок описания картины Огюста Ренуара «Бал в Мулен де ла Галетт»:

Музей Орсе
(1) Cette oeuvre est **sans doute** la plus importante de Renoir au milieu des années 1870 et fut **exposée à l'exposition** du **groupe impressionniste** de 1877.

Microsoft Translator
(1) Эта работа, **возможно**, является самой важной работой Ренуара середины 1870-х годов и была **выставлена** на **групповой выставке** импрессионистов 1877 года.

Google Translate
(1) Эта работа, несомненно, является самой важной работой Ренуара середины 1870-х годов и была **выставлена на выставке** группы импрессионистов в 1877 году.

Яндекс Переводчик
(1) Эта работа, **возможно**, является самой важной работой Ренуара середины 1870-х годов и была **выставлена на выставке** группы импрессионистов 1877 года.

Все три примера требуют редактирования. В вариантах Microsoft и Яндекс словосо-

четание *sans doute* (рус. *несомненно*) передано с ошибкой как *возможно*. Во всех примерах отмечается тавтология *выставлена на выставке*, которую можно убрать, заменив глагол на *была представлена / экспонировалась*. При передаче словосочетания *l'exposition du groupe impressionniste* (рус. досл. *выставка группы импрессионистов*) была допущена лексическая неточность: *групповая выставка импрессионистов*.

Заключение

Результаты проведенного анализа перевода отдельных фрагментов текстов медиадискурсов музеев, выполненного браузерными системами автоматического перевода, которые используют технологии нейронных сетей, показывают, что качество функциональных возможностей современных систем машинного перевода в большинстве случаев позволяет решать повседневные задачи, обеспечивая приемлемый уровень адекватности и эквивалентности:

– многоязычный ИИ в основном правильно передает имена собственные на языке перевода; номинативные и контекстуальные ошибки и неточности связаны с транскрипционной передачей имен собственных, известных в отдельных лингвокультурных пространствах;

– сложность представляют лишь изолированные номинации разделов и аббревиатуры кнопок переключения доступных языков, что свидетельствует о высоком уровне искусственного интеллекта, имитирующего человека в его обязательном стремлении получить контекст, актуализирующий значение слова;

– автоматические системы выбирают первое, самое частотное из многих возможных соответствий, не способны редактировать тексты и допускают тавтологию.

Таким образом, корректный, стилистически и дискурсивно оформленный перевод сегодня может быть выполнен только с участием человека. Специалистам необходимо далее осуществлять оптимизацию нейронных систем автоматизированного перевода.

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INTERPRETING METAPHORICAL LANGUAGE: A CHALLENGE TO ARTIFICIAL INTELLIGENCE

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Abstract. In recent years, numerous studies have pointed to the ability of artificial intelligence (AI) to generate and analyze expressions of natural language. However, the question of whether AI is capable of actually interpreting human language, rather than imitating its understanding, remains open. Metaphors, being an integral part of human language, as both a common figure of speech and the predominant cognitive mechanism of human reasoning, pose a considerable challenge to AI systems. Based on an overview of the existing studies findings in computational linguistics and related fields, the paper identifies a number of problems associated with the interpretation of non-literal expressions of language by large language models (LLM). It reveals that there is still no clear understanding of the methods for training language models to automatically recognize and interpret metaphors that would bring it closer to the level of human "interpretive competencies". The purpose of the study is to identify possible reasons that hinder the understanding of figurative language by artificial systems and to outline possible directions for solving this problem. The study suggests that the main barriers to AI's human-like interpretation of figurative natural language are the absence of a physical body, the inability to reason by analogy and make inferences based on common sense, the latter being both the result and the cognitive process in extracting and processing information. The author concludes that further improvement of the AI systems creative skills should be at the top of the research agenda in the coming years.

Key words: metaphorical language, analogical reasoning, artificial intelligence, LLM, metaphor interpretation, embodied cognition, inference.

ИНТЕРПРЕТАЦИЯ МЕТАФОРИЧЕСКОГО ЯЗЫКА: ВЫЗОВ ИСКУССТВЕННОМУ ИНТЕЛЛЕКТУ

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Аннотация. Актуальность работы обусловлена тем, что в последние годы многочисленные исследования указывают на способность искусственного интеллекта (ИИ) генерировать и анализировать выражения естественного языка, однако вопрос о том, способен ли ИИ действительно интерпретировать человеческий язык, а не имитировать его понимание, до сих пор остается открытым. Дополнительную сложность для систем ИИ составляют метафоры как неотъемлемая часть человеческого языка, которые являются не только распространенной фигурой речи, но и преобладающим когнитивным механизмом человеческого мышления. На основе обзора результатов существующих исследований компьютерной лингвистики и смежных областей в статье выделен ряд проблем, связанных с интерпретацией небуквальных выражений языка большими языковыми моделями (LLM). Показано, что в науке нет четкого представления о способах обучения языковых моделей автоматическому распознаванию и пониманию метафор, способных приблизить их к уровню «интерпретационных компетенций» человека. Цель исследования – выявить возмож-

ные причины, препятствующие пониманию образного языка искусственными системами и обозначить возможные направления для решения указанной проблемы. Установлено, что основные барьеры на пути ИИ к человекоподобной интерпретации образного естественного языка обусловлены отсутствием физического тела, неспособностью мыслить по аналогии и делать инференции на основе здравого смысла, последние при этом могут быть охарактеризованы одновременно как результат и как когнитивный процесс при обработке и извлечении информации.

Ключевые слова: метафорический язык, рассуждение на основе аналогии, искусственный интеллект, LLM, интерпретация метафор, воплощенное познание, инференция.

Introduction

Figurative and metaphorical language is a pervasive phenomenon in discourse, and figurative expressions play a critical role in communication and cognition. However, non-literal language is among unjustly neglected problems in natural language processing (NLP) research. It leaves the question of interpretability of figurative language by current large language models (LLMs) open. Multiple evaluations of the performance of current language models suggest that their abilities to recognize, analyze, generate and even interpret metaphorical expressions has improved dramatically, although they are still far from being similar to human ones.

As A. Ripley accurately notes, computer science defines AI as a human-like intelligence found in a robot, computer or some other machine. He clarifies further that, provided a machine succeeds in simulating things a human mind is capable of, one can refer to it as artificial intelligence [Ripley, 2021], and refers to the description of AI playing chess, found in the 2009 Rasskin-Gutman's book "Chess Metaphors: Artificial Intelligence and the Human Mind". The latter vividly captures how skillfully AI imitates the human mind and its processes:

"As a game, [chess] enables us to identify all the mental processes necessary to perform high-level cognitive activities. These include perception and recognition of patterns contained in the sixty-four squares of the board and its thirty-two pieces; long-term memory for remembering previously analyzed rules and games; working memory for paying attention, concentrating on the game, and effectively evaluating positions; search strategies for calculating and analyzing variations; and the psychological dimension resulting from

the dialogue between two brains, two ideas, and two strategic concepts that depend on the personality of each chess player" [Rasskin-Gutman, 2009].

The major difference in metaphorical competence between human and artificial intelligence may lie in the following: AI is only able to create and process metaphors "on demand" (i.e. when prompted by humans). However, its ability to spontaneously generate novel metaphors, without being exposed to the "real" world, without a body and physical experience, is close to zero. Similar ideas can be found in J. M. Murry's 1931 book "Countries of the Mind" who wrote: "Metaphor is as ultimate as speech itself, and speech is as ultimate as thought. <...> Metaphor appears as an instinctive and necessary act of mind exploring reality and ordering experience" [Murry, 1931, pp. 1-2].

As previously pointed out in one of our recent studies, AI currently analyzes and generates language, and thus metaphors by means of Natural Language Processing (NLP), an interdisciplinary branch dedicated to recognizing, generating and processing spoken and written human speech. AI is still considered weak, as it relies on human-defined algorithm parameters for its capabilities and mostly requires training data for its results to be accurate [Skrynnikova, 2023, p. 220]. Recognizing and understanding metaphorical language is still an unsolved problem for AI systems, and the reason for this is primarily the inability of machines to think by analogy. Metaphorical thinking is "one of the hypostases of analogical thinking," and metaphoricity is an inherent property of modern social thinking [Ilyin, 2013, p. 22]. Therefore, in this paper we treat metaphorical reasoning as a means of expressing analogical reasoning.

Analogical reasoning

Analogies focus our attention on how similar two seemingly dissimilar things are. As a cognitive tool, they enable us to infer properties or predict the behavior of an unknown object based on its similarity to a known one. If an unknown thing or phenomenon is similar to a known thing or phenomenon in many ways, it is possible to draw a logical inference about the unknown based on its similarity to the known. Analogical reasoning is one of the most important cognitive tools we apply to structure our understanding and beliefs about the world.

Modern neural networks cope comparatively well with certain tasks, but using what they have learned in one situation and transferring it to another one, which is what analogy is all about, is not one of them. Reasoning abstractly and building analogies as well as recognizing two or more different situations as essentially similar are solely inherent to humans. The question arises if we can potentially endow machines with this ability, and if so, how should we do that? Computers can recognize images, drive cars, and play various games. But they cannot flexibly and quickly generalize the information they have acquired and apply it to new situations. The analogies we constantly and unconsciously draw assist us in making sense about something new and previously unknown. The ability to analogize, intuition and common sense is the bridge between deep neural networks and human intelligence [Skrynnikova, 2023]. Our strong claim is that, until we teach machines to reason by analogy, they cannot be considered sufficiently robust and flexible to deal with the real world. Taking into account how diverse analogies can be, constructing AI agents that are capable of interpreting and generating analogies should focus on building various skills to understand relationships between objects.

As viewed by J. Pavlus, understanding the cognitive process of analogy, in other words, the ways we, humans, establish abstract connections between similar ideas, perceptions, and experiences, is the critical task which will enable to unlock the potential of human-like artificial intelligence [Pavlus, 2021]. To draw an analogy is to be aware of the nature of a situation by projecting or conceptually mapping it to another one that is already understood and previously known to us from our bodily experience. As Pavlus rightly notes, the role of analogy in modern research should therefore become more prominent than ever, especially in the field of AI, whose major advances over the past decade have largely been driven by deep neural networks, a technology that simulates the multilayered organization of neurons in the mammalian brain [Pavlus, 2021].

But why is analogizing so critical to AI? The reason is that analogies are a fundamental thinking mechanism that will be of paramount importance if AI is to achieve the performance we seek for. Its significance has only become apparent today when experts finally recognized that it is a fallacy to concentrate exclusively on the laws applied by logic, statistics, and programming when it comes to developing the "rules of behavior" for a machine to solve new problems. For instance, showing a deep neural network numerous images of bridges may ultimately result in its recognizing a new image of a bridge. But its ability to abstract the concept of a bridge to our interpretation of bridging the generation gap is, as of today, far from being obtainable [Pavlus, 2021]. It appears that these networks cannot and do not learn to extract existing information and apply it to new unknown situations.

The past decades have seen considerable research efforts to train a machine to reason by analogy. One of the earliest attempts is the Structure Mapping Engine in the field of AI based on a cognitive simulation program for learning analogy-based information processing [Falkenhainer, Forbus, Gentner, 1989] which focuses on the logical representation of situations and the construction of analogies between them. However, the issue of learning itself has been largely excluded from these systems. Structural mapping is based on words with "human meaning" (e.g., *the Earth revolves around the sun* and *an electron revolves around a nucleus*), but lacks some internal model of what exactly it means to "revolve around." Other systems like Copycat have handled this task but have been unable to find ways to generalize and extend them to more abstract domains [Hofstadter, Mitchell, 1994].

More recent and new approaches, such as meta-learning, are applied for machines "to learn" better. Self-supervised learning enables GPT-3-like

systems to acquire skills in completing a sentence with a missing word, which may seem an ostensibly convincing language generation task. The common claim NLP researchers make is that one merely needs to feed such systems sufficient data for them to easily perform analogy-making tasks. But it turns out to be not that simple. What we call "the meaning barrier" is still present. From M. Mitchell's perspective (2021), AI systems succeed in simulating understanding under certain conditions, but, deprived of them, become fragile and unreliable. Unlike humans, these systems cannot interpret the data they are dealing with. Another issue of concern is that there seems to be no consensus on what we mean by saying "understand the meaning of an utterance". Following M. Mitchell, we believe that the key to what we refer to as understanding is the mechanism of abstraction and analogy [Mitchell, 2021]. The latter allow for human flexibility preventing us from behaving like robots. It is due to reasoning by analogy that we find ourselves capable of comparing prior experiences to new formerly unknown or incomprehensible ones. We are adept in modelling what other people think, understand their goals, and predict what they are going to do by analogizing ourselves, putting ourselves in the other person's shoes, and matching our opinions to theirs.

Some researchers assume that deep learning is more promising in creating meaningful analogies, with deep neural networks "working wonders" between input and output layers. However, to this end, we need to create one large dataset to train and test the neural network. But having to train the system on thousands of examples suggests that the researcher has already lost. In this way, one misses the point of abstraction and deals with what machine learning experts call "few-shot learning" [Mitchell, 2021], i.e., training on a limited number of examples. For instance, the Abstraction and Reasoning Corpus (ARC) poses a serious challenge to machines to learn in a few steps. It is the case as the Corpus relies on the "basic knowledge" humans are endowed with since their birth. None of these systems are able to cope with providing machines with the ability to learn and reason using the background knowledge any child possesses. A machine is devoid of a physical body that provides humans with this basic knowledge the human brain resorts to to build numerous and novel analogies. Teaching a machine to reason analogically, in a humanlike manner, is only possible by its reliance on embodied experience which it currently lacks. The role of the body is critical when it comes to solving multiple problems requiring three-dimensional thinking and interacting with the world around, understanding how objects are connected in space.

Metaphorical embodiment

Throughout history, the human body has been viewed as a natural, purely biological entity, largely separate from the mind. A considerable body of embodied cognition research, on the contrary, argues in favour of heavy reliance of human abstract thinking abilities on people's knowledge of and experience with their bodies, predominantly through metaphorical reasoning. Bodily interaction with the world around and related experiences pervasively act as a source domain to alleviate and enhance our understanding of more abstract, intangible and loosely structured target domains (e.g., AFFECTION is WARMTH, a metaphor in which bodily reaction related to experiencing higher temperatures assists in better structuring our understanding of affection). Likewise, multiple source domains emerging from our daily bodily experiences are metaphorical per se.

G. Lakoff and M. Johnson brought greater systematicity to the analysis of metaphor as a cognitive mechanism in their conceptual metaphor theory (CMT), demonstrating the heuristic potential of applying the theory in practical research [Lakoff, Johnson, 1999]. L.A. Keefer and his co-authors in their study formulate the fundamental postulate of this theory as follows: the major source of primary metaphors is our body which is inseparable from a certain space and continuously interacts with its environment in different ways. According to this view, understanding of metaphorical expression occurs through a unidirectional projection of properties from a more concrete objectified source domain to a more abstract target domain. Further research has argued that if one formulates an abstract problem in terms of a bodily problem, the solution found to the latter can prompt a particular solution to a more complex, abstract problem [Keefer et al., 2014]. Cognitive linguistics, psychology, and

medical anthropology provide sufficient evidence to illustrate how various bodily experiences are understood symbolically and metaphorically. A classical example is understanding the immoral nature of one person's deeds towards another (an abstract problem) in terms of physical dirt (a bodily problem) by means of the metaphor IMMORALITY is DIRT. Accordingly, to *cleanse the conscience* a person may resort to a method similar to washing away physical dirt – washing hands, taking a shower, etc. This supports the hypothesis that metaphors push us to new ways of understanding abstract entities and solving complex problems. Consequently, bodily experience is inherently metaphorical, according to the metaphorical embodiment hypothesis [Migun, 2020; Gibbs, 2021].

The embodiment approach suggests searching for answers concerning the role of sensorimotor processes in metaphor processing. Researchers are currently preoccupied with the question whether understanding metaphors necessarily relies on sensorimotor systems and, if so, to which extent they are involved in metaphor processing.

Metaphorical reasoning is a crucial tool for bridging the divide between concrete and abstract concepts, enabling a more flexible organization of human cognition and action. This distinctive human capacity poses a significant challenge for artificial intelligence (AI) systems, which must be capable of comprehending metaphors in order to effectively interact with humans. We see the solution to such an ambitious problem in endowing AI with a model of the body moving and acting in the environment, with the ability to test the machines' ability to learn something about their bodies [Skrynnikova, 2023]. This idea is in line with O. Holland's opinion that it is impossible to study the emergence of natural language in humans without linking language to the body [Holland, Knight, 2006].

Latest endeavors
in metaphor understanding

Conceptual metaphor is a pervasive cognitive mechanism that aids our comprehending, experiencing, structuring, and reasoning of abstract concepts (the target domain), as noted by I.-M. Comsa et al. [Comsa, Eisenschlos,

Narayanan, 2022], by mapping them to domains available to us from our body's everyday interaction with the environment (the source domain). As G. Lakoff and M. Johnson claimed in their seminal work "Metaphors We Live By", in the pervasive metaphor TIME IS MONEY, time is understood in terms of monetary value. Therefore, it may be "donated" to others, one can "run out" of time or "invest" it in an activity. In this analogy, money acts as a source domain, serving as a basis for comparison with time. The latter, in its turn, acts as the target domain, being understood in terms of financial resources. There is a systematic unidirectional mapping from the source to the target domain [Lakoff, Johnson, 2003]. Conceptual metaphors structure our everyday language and are applied to map physical experiences and emotions onto abstract concepts. They enable us to convey complex ideas, emphasize emotions, and make humorous statements [Fussell, Moss, 1998]. Still, even though words are related different from their conventional definition, communicators easily interpret metaphorical phrases, and discourse is rife with them [Shutova, 2011], on average every three sentences [Mio, Katz, 1996; Fussell, Moss, 2008]. To illustrate the critical role of metaphor in abstract discourse, we will examine the example presented by I.-M. Comsa et al. in their study: *The economy is suffocating.* From the CMT perspective, understand this statement becomes possible owing to mental simulation, i.e. connecting the abstract concept of the economy to a sick person experiencing trouble breathing. We use the same mental imagery to conclude [Comsa, Eisenschlos, Narayanan, 2022] that the economy, like the gasping person, is sick and can die of suffocation. How do people interpret such a metaphorical statement as *once infected with an interesting idea, it is hard to be cured of it*, when they read it? Understanding such metaphorical expressions is possible because of the unique human ability to think by analogy and infer based on common sense. Moreover, human creative thinking treated as the ability to generate original ideas based on establishing new analogies between objects and phenomena facilitates generating and understanding new metaphorical expressions.

Reaching human-like performance levels in LLMs, as Comsa and his co-authors show in their

critical overview of previous studies, still looks as a surreal task, accounting for little progress which has been made in this area of research. They assume that heavy reliance on context-dependent word meanings in such tasks [Neidlein, Wiesenbach, Markert, 2020] can be one of the possible reasons for this, criticizing them for inability to measure a machine's ability to reason with metaphors [Comsa, Eisenschlos, Narayanan, 2022]. The new surge of attention to metaphor is solely related to natural language processing problems, with most tasks focused on its detection [Choi et al., 2021; Leong et al., 2020] predominantly in sizeable annotated corpora [Klebanov et al., 2016; Steen et al., 2010], which is not sufficient to reach near-human interpretability in LLMs.

As we have remarked before, researchers in recent years have been increasingly focused on creating systems capable of generating and recognizing metaphorical language, mostly combining AI reasoning and corpus-based modeling of formulaic expressions. However, they lack agreement and any clear idea concerning the ways of training the system not only to use metaphor, but also, which is more important, to endow it with inferencing abilities, where inferences are treated as the result and the very cognitive process associated with information processing and retrieval [Skrynnikova, 2023].

Metaphors are interpreted by AI using natural language processing based on a process referred to as metaphor analysis. Possible uses of metaphor analysis include translation software, political affiliation and social choice prediction. Education is another possible area of applying metaphors due to their ability to promote creativity and explain complex abstract phenomena and concepts [Shutova, 2015, p. 617]. To effectively interpret a metaphor, as A. Ripley suggests, the two main methods are mainly applied in computational linguistics research: metaphor explanation and metaphor paraphrasing. The overview of the existing approaches made in his research [Ripley, 2021] suggests that the essence of the former is to analyze and correlate the properties of the source and target domains while the latter focuses either on more literal expressions or commonly used paraphrases of the original metaphors. The explanatory method feeds into the Slipnet system, which uses concepts attributes common to both source and target

domains, as well as facts found on the Web [Veale, Hao, 2008]. The authors particularly emphasize that this system can identify relationships between the source and target domains by creating substitutions and modifications to the definitions of these attributes. To ensure that a mapping is possible, as T. Veale and Y. Hao claim, the AI is attempting to identify as many common analogies as possible between the source domain and the target domain. They further note that paraphrasing of all the verbal components of the metaphorical phrase is the prerequisite for the AI to interpret the metaphorical phrase literally and, hence, understand it. There is also the general agreement in the computational linguistics community that the majority of metaphor interpretation methods involve replacing parts of a metaphorical phrase at some point [Veale, Hao, 2008].

The problem with the above-mentioned approaches is that AI relies entirely on human predefined interpretation algorithms. Notwithstanding, existing metaphor repositories include only conventional metaphors, and, therefore, when one needs to interpret non-conventional figurative expressions, AI is unlikely to cope with this very few benchmarks aimed at evaluating the ability of LLMs to reason with conventional metaphors. The existing body of research in this field has been critically analyzed by I.-M. Cosma and his team to include a collaborative multitasking test, the BIG benchmark [Srivastava et al., 2022], designed to test various LLM competencies and including four metaphor-related assignments. Its major flaw, in their view, is that its tasks do not enable us to assess the ability to use metaphorical knowledge in reasoning, although they contain novel non-conventional metaphors. The subsequent study by E. Liu et al. [2022] assumed an interpretation task, that asked models to choose the correct of two metaphor interpretations, and lacked any reasoning-related tasks. The same is true about Chakrabarty's research team [Chakrabarty, Choi, Shwartz, 2022] who elaborated a dataset containing multiple choice story continuations based on comparisons and idioms extracted from books [Comsa, Eisenschlos, Narayanan, 2022].

Combining metaphor understanding with common sense-based inference on the basis of a more systematic data source in the MiQA benchmark, proposed by Comsa and his

colleagues [Comsa, Eisenschlos, Narayanan, 2022], seems a more promising endeavour to solve the problem of understanding metaphors by AI systems. As they rightly claim, the need to choose between two semantically similar items instead of items with opposite meanings is seen as another advantage of such a benchmark test. The results suggest that in the absence of cues, LLMs' ability to perform well on metaphorical language comprehension tasks, particularly in small datasets is considerably limited. It means that further research into improving the performance of smaller models, if possible, should be among the top research priorities in the short run. Furthermore, this reveals the LLMs' genuine ability to reason with conventional metaphors, not just recognize them. Even a more ambitious task in the coming years is to figure out whether this ability extends to non-conventional metaphors.

Conclusion

Summarizing the above considerations about the problems of natural language processing in general, and understanding metaphorical language by AI in particular, we can conclude that the further development of human-machine relations should be focused on the development of AI creative abilities necessary for the interpretation of figurative language. Nonetheless, it is obvious that the term "understanding", which is quite clear to us in the "human" sense, is characterized by complexity and ambiguity in the context of AI.

As we previously emphasized, with the latest achievements observed in terms of LLMs' capacities to detect and recognize metaphors, their ability to understand non-literal language is far from being comparable to a human one, and its further honing is an ambitious task for computational researchers [Skrynnikova, 2023]. The main difference from machine knowledge processing is seen in the fact that metaphor understanding is possible solely due to linguistic creativity and human creative efforts and can hardly be subject to the rules to which AI systems are currently subjected. The predictive power of existing systems remains considerably low. Automatic recognition of AI metaphors followed by the ability to interpret and reason with figurative expressions is still an ambitious task for the coming years, requiring integration of knowledge and combining the efforts of researchers from different fields. It has become evident that focusing solely on the laws of logic, statistics and programming in developing the "metaphorical competencies" of a machine to solve new problems has not achieved the desired results.

Thus, we believe that the fundamental obstacle preventing machines from genuinely interpreting metaphorical language is their inability to reason by analogy, which results from the lack of a physical body in their interaction with the world around them. This is further compounded by their inability to draw common sense inferences without being prompted by humans, as well as their limited predictive power. An ontological gulf stretching between human reasoning and artificial intelligence is still insurmountable. The unique creativity found in humans and not limited to the perception and understanding of texts, is the undebatable prerogative of human intelligence, which is not inherent in AI. It corroborates the idea that a creative mind and the imitation of a reasonable answer in solving a problem are profoundly different sorts of things.

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ДИСКУРСИВНАЯ ИНТЕРПРЕТАЦИЯ ФЕНОМЕНА «ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ» В МЕДИЙНОЙ КОММУНИКАЦИИ

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MEDIATIZATION OF ARTIFICIAL INTELLIGENCE CONCEPT IN THE RUSSIAN LANGUAGE MEDIA DISCOURSE: CORPUS-BASED APPROACH [1]

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Abstract. Based on corpus-assisted discourse analysis, the paper studies the mediatization of artificial intelligence (AI) technology in the Russian-language media discourse as a construe technique that shapes AI perception and evaluation as a concept of new social reality. The paper reveals linguistic portraying of the AI concept in Russian digital media corpus, construed by business-oriented outlets *Kommersant*, *Vedomosti*, *RBC*, and popular media resources, such as *Lenta.ru*, *Argumenty i Fakty*, *Komsomolskaya Pravda*. Corpus-assisted discourse analysis comprises aims to extract the quantitative parameters of texts and establish their correlations with content parameters; define the themes of narratives about AI, which determine its discursive interpretation, and describe their distribution across the Russian-language news digital corpus; define discursive strategies used for designing the image of AI. The quantitative characteristics of the texts construing AI imagery in the corpus under study point to the prevalence of small and moderate size texts, which is explained by the pragmatics of informing a broad lay audience on advancement and development of AI without initiating any public discussions. The thematic distribution analysis showed domination of "Positive AI capabilities" and "AI development and Investments", whereas "Impending danger" and "Negative AI capabilities" are covered infrequently. Argumentation in the explanatory and prognostic strategies introduces the topoi of inevitability, necessity, and rivalry in AI development. The explanatory strategy expands on the nature of AI, its functions and potential. The prognostic strategy delivers information on the development and advancement of AI technology, portraying efficiency scenarios, but only a tiny fraction of the texts warn about the negative consequences of AI. The novelty of the results lies in the establishment of contradictory mediatization of the AI concept, which, on the one hand, is aimed at depicting its positive portrayal and capability of bringing social and economic benefits. On the other hand, it contains a warning about its potential dangers and risks if the spheres of its application expand.

Key words: medialinguistics, artificial intelligence, mediatization, topic representation, discursive strategy, corpus-assisted discourse analysis, key words analysis.

МЕДИАТИЗАЦИЯ КОНЦЕПТА «ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ» В РУССКОЯЗЫЧНЫХ СМИ: КОРПУСНЫЙ ПОДХОД [1]

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Аннотация. Методом дискурсивно-корпусного анализа изучена русскоязычная практика медиатизации технологии искусственного интеллекта (ИИ), формирующая его восприятие и оценку как концепта новой социальной реальности. Материалом исследования послужили тексты бизнес-ориентированных изданий «Коммерсант», «Ведомости», «РБК», а также популярных медиаресурсов «Lenta.ru», «Аргументы и факты», «Комсомольская правда». Дискурсивно-корпусный анализ включает: извлечение количественных параметров текстов об ИИ и установление их корреляции с содержательными параметрами; определение тематики нарративов об ИИ, задающей специфику его дискурсивной интерпретации, описание дистрибуции тем в собственном русскоязычном цифровом корпусе новостных текстов; выделение дискурсивных стратегий конструирования образа ИИ. Анализ количественных параметров продемонстрировал доминирование текстов малого и среднего размера, что объясняется прагматикой информирования общественности о достижениях и перспективах развития в области ИИ: они не предназначены для стимулирования публичных дискуссий. Тематика нарративов об ИИ представлена в десяти категориях при доминировании тем «Положительные характеристики ИИ» и «Развитие и финансирование технологий ИИ», темы «Угрозы, связанные с ИИ» и «Негативные следствия ИИ» не являются активно востребованным. В аргументации используются объяснительная и прогностическая дискурсивные стратегии, основанные на топосах неизбежности, необходимости, конкуренции в области ИИ. Тексты, реализующие объяснительную стратегию, характеризуют природу ИИ, его основные его функции и возможности. Прогностические тексты, передающие информацию о развитии и совершенствовании технологий ИИ, преимущественно рисуют положительные сценарии будущего, малая часть текстов содержит предостережения о возможных негативных последствиях ИИ. Новизна полученных результатов заключается в объективизации данных о стратегиях медиатизации феномена ИИ, которые направлены на конструирование положительного образа ИИ, возможности решения с его помощью социальных и экономических проблем и включают предупреждение о потенциальных опасностях и рисках при расширении сфер применения ИИ.

Ключевые слова: медиалингвистика, искусственный интеллект, медиатизация, тематическая репрезентация, дискурсивная стратегия, корпусный анализ дискурса, метод ключевых слов.

Introduction

The phenomenon of Artificial Intelligence (AI) has recently aroused sensationally strong curiosity and provoked heated discussions of technologically advanced crews and a general community thus shaping paradoxically equivocal public perception of AI, either as a great technological invention that promises an incredible potential for tackling social challenges or as an imminent and inescapable danger for humanity.

Initially, AI was associated with the process of engineering and making intelligent machines or computer programs that might explore intelligence as the computational part of the capability to store and analyze big data and so solve some urgent social challenges [McCarthy, 2007]. Having gained certain technological advancement by demonstrating far-reaching and profound impact on various spheres of modern social life [Elias, 2023], AI has undoubtedly sparked common interest to its branches and applications and has become a prominent topic in

current discussions. Despite its positive appreciation, AI is being portrayed by media as a 'double-edged sword' whose risks include misuse, errors and the possibility of malfunctions resulting in severe consequences, as well as privacy concerns, ethical dilemmas [Cheatham, Javanmardian, Samandari, 2019; Nguyen, Hekman, 2022]. The information basis limitations are also being debated as lacking a sense of 'truth' that results in its false answers [OpenAI, 2023]. Increasing prominence in the public eye and paradoxically alternative appreciation of AI as a new socially important concept calls for linguistic monitoring on how online and print news media contribute to its discursive portraying for the public through certain media techniques. Such studies should be based on methodology of medialinguistics [Dobrosklonskaya, 2020], which sets as its goal examining the process of mediatization of various concepts and phenomena of social importance [Klushina, 2014; Shmeleva, 2015]. Mediatization as a phenomenon under study is viewed as a discursive model capable of enduring impact on community consciousness by special tactics of informing the public about technologically or socially vital concepts, phenomena, practices or trends [Ilyinova, Volkova, 2023]. In this regard, media do not only verbalize concepts and ideas, giving them an evaluative interpretation, but also construe and introduce images able to manage the perception or the angle of the public evaluation.

Depending on the choice of focus, mediatization might be described in philosophical, institutional, cultural-and-social perspectives, or studied as discursive practice in communications. The institutional approach considers it as a social process, which is stimulated both by the development of media and by the dynamics of other institutions, in which social agents try to use media resources to attain their purposes [Hjarvard, 2013, pp. 123]. The socio-constructivist approach aims at the study of coordination between the media channels improvement and cultural changes in everyday communicative practices [Lundby, 2014, pp. 10-11], or on how such alternations in practices are connected with the change of communicative construction of reality [Hepp, Couldry, 2013, pp. 118].

Meditatization is viewed in Russian medialinguistics as the cognitive-and-discursive process of impelling the individuals' or public consciousness by various media techniques,

consequently, a mental picture of the world is formed through specific media cogniostrategies [Rogozina, 2003, pp. 124]. Presumably, the process of qualitative changes in public consciousness goes under the influence of media information methods [Kozharnovich, 2021, pp. 423], and media is described as a special communicative channel with the aim to stir zones of public discussion on socially urgent issues [Klushina, 2014]. Mediatization encompasses various spheres of social world, therefore, the objects of meditatization may be urgent concepts in politics [Baykulova, 2017], jurisprudence and law [Annenkova, Chernogor, Pilgun, 2018; Kondratyeva, Ignatova, 2021], professional discursive practices in journalisms, news making on technologies and social phenomena [Bednarek, Caple, 2012]. It is worth noting that the media interpretation of socially important knowledge contributes not only to popularization of reliable and proficient information, thus improving the quality of the content, but also bears the risk of generating and disseminating destructive social practices [Kozharnovich, 2021; Kochetova, Ilyinova, 2023].

All of the above points to cognitive complexity of the methodology sufficient for discursive study on mediatization of any contemporary or newfangled concept of the day. However, it is due to corpus linguistics techniques that the researchers can provide objective judgments on the media discursive practices, enabling detection of the trends with the quantitative data. We assume that corpus tools, based on an array of texts, help establish common themes, patterns and strategies of conceptualizing socially significant phenomena, shaping their perception by members of the discursive community through deriving value meanings.

As the scientific inventions and technologies are gaining their popularity these days, media discourse gains control over determining their social assessment by multiple descriptions in various styles of information delivery. Talking on undergoing actuality changes, mass media as a powerful tool of mediatization have focused public attention on such scientific and technological developments as nanotechnology [Cutcliffe, Pense, Zvalaren, 2012], cloning [Holliman, 2004], gene modification [Tucker, 2013], and digital technology [Guzman, Jones, 2014], thus playing a crucial role in commenting on these concepts.

As far as artificial intelligence technologies, whose rapid spread has sparked debate about their benefits, potentials and risks, have become the focus of media agenda, it deserves setting a corpus-discursive monitoring on an estimative perception of AI, the Big Data concepts and neural networks in modern media. We suggest it that news reports make such trends visible. By discursive representations of benefits, errors and risks, they shape the perception of AI technologies, thus influencing public appraisal [Lupton, 2017; Pentzold, Landinez, Baaken, 2019; Zhai et al., 2020].

Recent discursive studies have identified various tints of AI perception, depicting it as an instrument of social control and (or) development [Kolyanov, 2022]. Other studies on AI technologies in media are limited to selected countries, such as the US [Fast, Horvitz, 2017; Garvey, Maskal, 2020], the UK [Roe, Perkins, 2023; Kochetova, 2023]. Several Russian researchers have explored professional discourses that depict the ideologeme of AI as a phenomenon regulated by competent bodies and empowering businesses with its beneficial potential, along with amplifying the capabilities of human beings [Sokolova, 2023]. As a result, modern academic descriptions of AI are focused on its integration into cognitive net of mass discourse, thus indicating its crucial role in shaping present and future sociotechnical pathways. However, representations of AI in Russian public media discourse and the vectors of its social assessment through the discursive techniques and linguistic resources of mediatization in various news outlets have not yet been deeply investigated.

This study is aimed at discursive analysis of narrative topics of artificial intelligence in Russian-language digital news outlets over 2020–2023. Based on a corpus-assisted discourse analysis of the most popular news websites, it seeks to assess how the media portrays AI to Russian public and discover direct and implicative strategies of its mediatization. The research questions are as follows: 1. What quantitative characteristics do the narratives about AI demonstrate in terms of the text size and lexical variety and do they differ when they exploit a specific topic? 2. What topics related to AI do the Russian media promote and how are they distributed across the corpus? 3. What strategies for discursive portraying of AI are employed in the Russian quality and popular digital media sources? What rhetoric topoi do they rely on?

Material and methods

The research is based on the constructivist theory of discourse, viewing it as a set of texts that define the social and political context of a phenomenon, forming ideology or way of thinking [Laclau, 1995]; understanding discourse as a substantive and thematic commonality of texts [Chernyavskaya, 2017, p. 142]; theory of mediatization [Klushina, 2014]; corpus-assisted discourse studies [Baker, 2006; Teubert et al., 2007; Anashkina, Konkova, 2021]; analysis of modern Russian media discursive practices [Brodovskaya et al, 2019; Zmazneva, 2018]; research tackling linguistic representation of socially significant phenomena [Efremova, 2017; Rebrina, 2021; Kondratyeva, Ignatova, 2021; Parvaresh, 2023; Sokolova, 2023].

With a growing interest in mediatization techniques, automatic text analysis tools are of great importance as they enable the processing of a bulk of texts related to phenomena under study (see, e.g. [Boykoff, Roberts, 2007; Grundmann, Scott 2014; Schmidt, Ivanova, Schäfer, 2013]). The use of corpus linguistics (CL) methods, including frequency lists, keywords, clusters, collocates, and concordances, is crucial to corpus-assisted discourse analysis [Baker, 2006; Liu, 2022]. On the one hand, computer-assisted corpus analysis opens the gate to large text samples examination and important linguistic patterns identification; on the other, the corpus-analysis findings must be interpreted and described by integrating discourse analytic methods and theories [Baker, McEnery, 2015; Baker et al., 2008; Cheng, 2013; Liu, Ma, 2022]. In discourse analysis, CL methods allow dealing with large numbers of texts, making empirical test research assumptions and generative findings which would be impossible through manual analysis of a small sample, thus reducing researcher bias in selecting and interpreting data, and replicating analytic procedures [Baker, McEnery, 2015; Friginal, Hardy, 2014; Lin, 2021].

The corpus compiled for this study comprises narratives about artificial intelligence (AI), selected by keywords and phrases in search queries. Core units in the list include *iskusstvennyj intellekt* (*artificial intelligence*), *nejroset'* (*neuro network*), *roboty* (*robots*), *robototehnika* (*robotics*), *chat GPT*, *Yandex-GPT*.

The samples were retrieved from the news media outlets that were selected as appealing to professionals at *Kommersant, Vedomosti, RBC*, and general audience at *Argumenty i Fakty, Lenta.ru, Komsomolskaya Pravda* with the three criteria: circulation, content and target audience. The first three media outlets have a clear bias towards business news and target a business-oriented audience concerned for analytics, economy and business. More than 9 mln unique visitors search the website www.vedomosti.ru every month, www.kommersant.ru reports on about 26 mln visitors a month. According to https://companies.rbc.ru/statistics/, the website of the RBC daily newspaper registers over 2 mln users every month. The other group includes popular media outlets. In 2021–2022, the site of *Komsomolskaya Pravda* had about 80–95 mln unique visitors a month. Every weekly issue of *AiF.ru* is reported to be read by 6 mln people. *Lenta.ru* stays among frequently visited digital news sites with about 22 mln visits a month (https://www.similarweb.com/ru/website/lenta.ru/#traffic). These media are thought to be influential voices in Russian media space and they cover artificial intelligence from different angles. Table 1 presents data on the structure of the media texts corpus "Artificial Intelligence" (AIC). The corpus comprised 243 documents, the corpus size is 298 157 tokens.

The compiled corpus was processed with *LancsBoxX* (version 3.0.0.) [https://cqpweb.lancs.ac.uk/], offering the function of downloading a corpus built using one's own data. The analysis of the lexical material of AIC was carried out with the methods of corpus linguistics, including the concordance and contextual analysis, techniques of semantic analysis, statistics, and interpretation of discursive semantics. The research design included several steps. We used the corpus tools to retrieve the information about the quantitative characteristics of texts, such as size and lexical density. Then, we sought to identify topics of the narratives that position the technology in certain contexts and give it the

prominence by emphasizing specific features. For this purpose, we first read all the texts in the corpus closely, identifying core issues and themes in the depiction of AI and establishing their distribution across the corpus. Secondly, we identified discursive strategies of AI representation. We also revealed language means used to construe rhetorical topoi, such as *inevitability*, *necessity*, and *leadership* of AI across media outlets, independent of the resulting imaginations. We explored the relationship between these building blocks, understanding them as part of a coherent (but not necessarily linear) narrative leading to a specific AI vision. Finally, we examined the pragmatics of the texts in order to uncover their leading intentions, and we established correlation between the text size and its pragmatic functions, which allowed us to draw some inferences.

Results and discussion

Quantitative characteristics of the texts construing AI imagery in the Russian news media discourse

One of the oldest problems in research concerning discourse that is meant to inform the addressee is how to determine whether or not a discourse is comprehensible to a specific target group. Among the quantitative parameters that are used to measure the comprehensibility of the texts researchers enumerate lexical density, text size and text complexity. Lexical density is defined as the proportion of the number of word types to the number of tokens. As pointed out in [McCarthy, Jarvis, 2010], lexical diversity can be assessed in many ways and each approach may be informative as to the construct under investigation. For the comparison of files of varying sizes, we need to go beyond a simple Type/token ratio (TTR), which expresses the proportion of types relative to the proportion of tokens, and compute more sophisticated measures such as Standardized type/token ration (STTR) or Moving average type/token

Table 1. **The structure of the Russian language "Artificial Intelligence" Corpus (AIC) (2021–2023)**

Broadsheet papers	The number of words	An average number of words	The number of texts	Tabloid papers	Number of words	An average number of words	The number of texts
vedomosti.ru	31004	620	50	lenta.ru	13923	278	50
kommersant.ru	39502	564	70	Aif.ru	10078	373	27
rbc.ru	6683	445	15	Kp.ru	17144	816	21
Total	**77189**	**543**	**135**	*Total*	**41145**	**489**	**108**

ratio (MATTR). TTR cannot be used to compare texts of different sizes in a corpus because it is calculated by dividing the number of types in a text or corpus by the number of tokens, so it decreases with text size. Moving average type/token ration (MATTR) is calculated by dividing a text into standard sized overlapping segments as a window moves through the file one token at a time. TTR is calculated for each overlapping segment and then the mean value of the TTRs is taken. MTTR is suitable for comparing texts of different sizes. As the size of texts is mainly within the range between 99 and 300, we chose the size of the window to be equal to 50 words (MATTR50). The non-standardized type/token ratio of the whole corpus is 0.1701, the STTR1000 is 0.5548, whereas MTTR50 values calculated for each text are much higher and vary from 0.83 to 0.96. These findings allow us to conclude that in general AI narratives employ a limited vocabulary that can be reduced to a restricted number of topics. However, high values for individual texts can be explained by the high number of word types in Russian due to the use of inflections, and the low frequency of grammar words within the boundaries of a single text.

The Text tool that is available in *LancsBoxX* (version3.0.0) provides an overview of all files (texts) in the corpus, their size and lexical diversity. It also allows in-depth analysis of individual texts in the full view mode. The tool also searches texts and offer an overview table with a breakdown of frequencies and relative frequencies per file. It can be used for the purpose of visualization of corpus files and understanding their distribution in terms of their sizes, lexical diversity and frequencies of linguistic features in them presented in Figure.

As the data in Table 2 show, a text size varies from 99 to 3000 words. The texts were divided into groups that fall within the following intervals: 99–300 words, 301–600 words, 601–1000 words, 1001–1300 words, 1301–2000 words, more than 2000 words.

Most texts, more than a half of the total number (53.4%), lie within the range from to 99 to 300, regardless of the type of the media outlets. With an increase in the number of words the number of texts dropped dramatically, with only four texts being of a significant length, which requires a reading of more than 8 minutes. These figures have important implications. It means that the texts about AI as well as other texts on web sites devoted to digital technologies are not supposed for long reading and their function is mainly to inform the reader about advancements in the field and
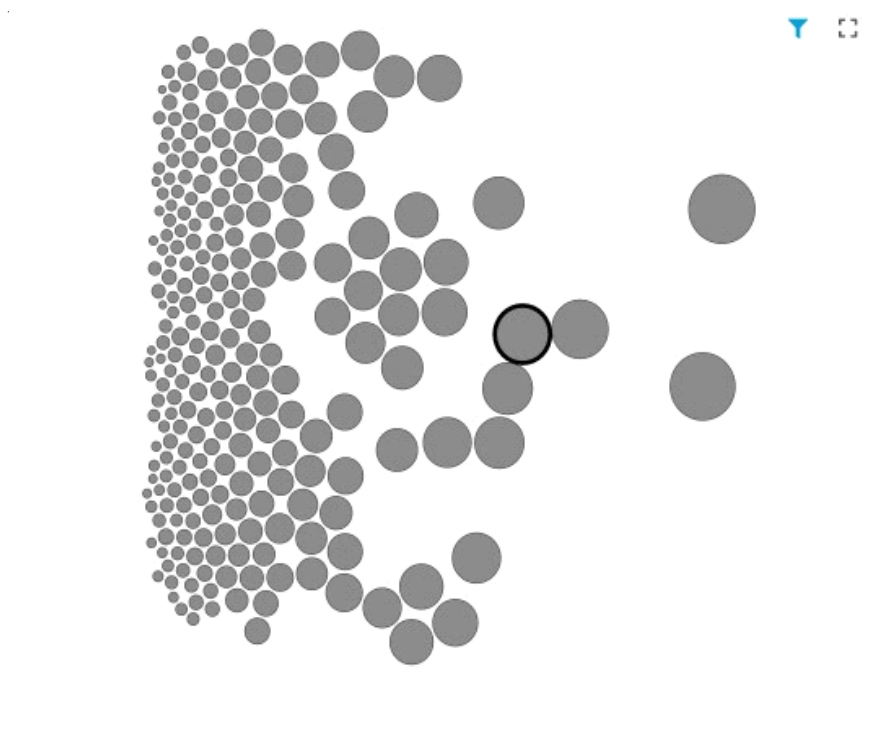
The distribution of texts according to the size in the AI media corpus

Table 2. **The texts ranked according to the size in the corpus**

The size range	The number of texts	%
99-300	129	53.4
301-600	62	25.5
601-1000	19	7.8
1001-1300	15	6.1
1301-2000	14	5.7
more than 2000	4	1.5
Total	**243**	**100**

prospects of its use. They are aimed to build awareness of the topic but not to stimulate discussions. Long texts employ an explanatory strategy that introduces the concept of AI to a general audience, which aims to overcome potential distrust and fear towards the new technology. The strategies employed to construe AI imageries and correlations between a text size and its topic will be discussed in the next sections.

Qualitative characteristics of the texts construing AI imagery in the Russian news media discourse

Topic modelling across the media segments in the AI corpus

To model topics, we followed the categories developed in [Roe, Perkins, 2023], who identified six themes as 'impending danger', 'explanation/ information', 'negative capabilities of artificial intelligence or ChatGPT', 'positive capabilities of artificial intelligence or ChatGPT', 'Humorous/ Comedic', and 'Experimental Reporting'. Based on the content of our corpus, we modified the themes and identified the ten most frequent ones that were labelled as 'Employment', 'Impending danger', 'Positive AI capabilities', 'Negative AI Capabilities', 'Legal Regulation', 'Education', 'Events', 'Economic Benefits', 'AI development and investment', and 'Experiments with AI'. The themes are listed in Table 3 with a brief description highlighting some of the key linguistic features that characterize them.

The content analysis revealed that the most common theme in the articles was 'Positive Capabilities of AI' that describes how AI can benefit individuals or society. Different news outlets give varying prominence to the application of AI in assorted spheres, including industry, medicine, banking, legal systems, agriculture, management, and governance, as can follow. In example (1), AI is described as having the potential to reduce time and effort for people applying to the bank for a mortgage:

Table 3. **Themes identified across the Russian language media outlets**

Theme	Description
Positive AI capabilities	Articles describe ways in which AI can generate overall benefit for society or improve upon an existing, human-driven process
Impending danger	Articles used highly evaluative language indicating imminent societal damage, disruption, or severe undesirable consequences relating to unforeseen impact of AI (e.g. climate change, fake news, plagiarism etc.)
Employment	Articles emphasize the shortage of qualified staff for AI industry
Negative AI capabilities	Articles describe what could be employed with ChatGPT or AI in order to commit crimes, esp. in cyberspace or harm others
Legal regulation	Articles used modal words to state the necessity of legal regulation of AI, exercise control over its development and application
Science and Education	Articles describe the use of AI in education, the issue of using GPTchats in searching for information for research and students' papers
Events	Articles describe meetings, panel discussions, exhibitions, conferences etc. devoted to AI development and implementation
Economic benefits	Articles describe benefits and profits that can be generated due to the use of AI
AI development and investment	Articles report on advancements in AI development, specify the amounts invested in the field, explain the basic functions of artificially intelligent programs and chatbots, including YandexGPT, or describing a recent product addition or upgrade
Experimental use of AI	Articles report on individual uses AI or YandexGPT in an experimental way to complete tasks, write a text, or achieve an outcome in an experimental fashion

(1) Альфа-Банк научил искусственный интеллект **одобрять ипотеку** без анкеты (Kommersant).

Text (2) demonstrates applications of AI in medical routines where it can replace a human General Practitioner (doctor) and carry out the task in a better manner:

(2) Меньше рутины, больше дела: как нейросети **помогают** московским врачам (rbc.ru)

They both give a use-case of AI which shows a positive impact that mostly concerns the change in the routine procedures.

The category 'Impending danger', which is in contrast with the 'Positive capabilities of AI' category, includes articles that discuss potential disruptions and dangers posed by AI technologies. Articles like these tend to emphasize the unforeseen impacts of AI technologies that may cause societal damage or severe consequences, such as replacing humans in various spheres, possessing abilities that surpass humans, spreading propaganda on a global scale etc., e.g.:

(3) Опасность «слишком развитого ИИ» заключается в том, что он может **наводнить** каналы пропагандой, **отнять** у людей работу и привести к созданию нечеловеческого разума, который способен **перехитрить** человека и сделать его знания устаревшими и ненужными.

The theme 'Employment' raises issues related to the shortage of qualified workforce in AI industry. If an article mentions the loss of jobs due to AI development we include it into the category of 'impending danger', e.g.:

(4) Представители офисных профессий могут в будущем **потерять работу** из-за искусственного интеллекта (ИИ) (lenta.ru).

By contrast, the theme 'Employment' stresses a low competition in the AI industry, which contributes to the promotion of university programs related to AI development and training, e.g.:

(5) По данным hh.ru, **конкуренция на вакансии**, связанные с работой в этих областях, очень **низкая**: менее двух человек на место (kommersant.ru);

(6) Искусственный интеллект **ищет** добрые руки. Главным ограничением его внедрения становятся кадры (kommersant.ru).

The topic 'Education' generally describes consequences for schools and universities arising from AI implementation, in (7) the article reports that universities are ready to embrace AI technologies and allow students to use GPT or chat-bots to prepare graduate papers; in (8) the article emphasizes the necessity of transformations and changes in education due to AI development, text (9) describes the use of AI in education as inevitable:

(7) В МГПУ **разрешили использовать искусственный интеллект** для написания дипломов (lenta.ru);

(8) Как ИИ меняет высшее образование. **Развитие технологии искусственного интеллекта требует изменений** от системы высшего образования. Трансформировать нужно не только программы обучений, но и сами методики преподавания и контроля (rbc.ru);

(9) Участники ПМЭФа **оценили угрозу искусственного интеллекта для высшего образования.** В Минобрнауки считают **борьбу с его применением бессмысленной** (lenta.ru).

We identify the topic 'Events', when articles inform about conferences, forums, meetings, panel discussions devoted to public talks about AI achievements and development, future scenarios of its implementation, e.g.:

(10) Сбер рассказал о перспективах искусственного интеллекта в креативных индустриях. <...> **Сессия** прошла в рамках фестиваля-форума «Российская креативная неделя». На ней **выступили** спикеры Сбера – Денис Димитров, исполнительный директор по исследованию данных Управления перспективных технологий AI и Екатерина Дятко, исполнительный директор Департамента данных и рекомендательных систем B2C (lenta.ru).

The topic 'Legal regulation' discusses issues related to copyright, regulation and control over the AI development, e.g.:

(11) В правительстве **обсуждают новое регулирование** работы с нейросетями (kommersant.ru).

The two related topics are 'Economic benefits' and 'AI development and investment'. The former raises the issues of positive changes in the economy, describe benefits and profits that can be generated due to the use of AI, e.g.:

(12) Российские ученые **нашли способ ускорить обучение искусственного интеллекта** (lenta.ru);

(13) Искусственный интеллект **обойдется** России **дороже** (vedomosti.ru);

(14) Исследовательские центры запросили дополнительное **финансирование** для проектов в области ИИ (vedomosti.ru).

The latter reports on advancements in AI development, specify the amounts invested in the field, explain the basic functions of artificially intelligent programs and chatbots, including YandexGPT, or describing a recent product addition or upgrade, e.g.:

(15) ...«Яндекс» **запустил бета-версию нейросети** для генерации изображений по текстовым запросам пользователей. Его назвали «Шедеврум». Приложение доступно на мобильных платформах Android и iOS (vedomosti.ru).

Articles report on individual uses AI or YandexGPT in an experimental way to complete tasks, write a text, or achieve an outcome in an experimental fashion, which often use the verbs *запустить* (launch), *испытать* (test), e.g.:

(16) Медиатехнолог Лобушкин **запустил** интервью-шоу с участием ИИ (lenta.ru).

The comparative analysis of Russian-language narratives about AI from the two types of media outlets showed that they raise similar topics, however, there are some differences in their distribution across the media segments (Table 4).

We compared the number of the texts and the word count for each AI topic to see which AI issues are at the top of promotion

The analysis of the AI Russian Corpus (AIC) show that in both outlets categories the two dominants themes are 'Positive AI capabilities', which accounted nearly half of the total number of articles collected (44.8 and 49.3%); 'AI development and Investments' comprise about a quarter of the texts in the popular press (26.1%) and only 15% in the business-oriented outlets.

The analysis of concordances revealed that the theme 'Positive AI capabilities' seems to vary significantly with the type of the newspaper outlet. The AIC shows that business-oriented outlets, such as *Kommersant*, emphasize AI capabilities in banking, industry and agriculture, thus, relating its implementation to societal values; popular press raises more often AI positive capabilities in medicine (20%), which accounts for almost two times higher texts than in the quality segment (10% vs 20%, respectively). We may suggest that the priority of this topic in the popular press is due to the target audience it addresses. Health issues are of interest to a broad lay audience, they are oriented towards individual values and echo with numerous health-related TV programs and shows. AI products are often portrayed as a relevant and competent solution to a range of public problems. Journalists or commentators rarely question whether AI-containing technologies are the best solutions to such problems or acknowledge ongoing debates concerning AI potential effects.

Table 4. **Artificial Intelligence topics distribution in the Russian language media**

AI topics	Business Press			Popular Press		
	Number of texts	Number of words	%	Number of texts	Number of words	%
Positive AI capabilities	61	20 021	4.8	46	13 116	49.5
AI development and Investments	24	18 973	15.3	28	10 927	26.1
Impending danger	0	0	0	10	8 067	9.3
Experiments	6	3 933	4.4	5	879	4.6
Negative AI capabilities	7	7 767	5.1	4	1 206	3.7
Education	3	1 276	2.2	4	2 565	3.7
Employment	5	2 827	3.6	3	2 586	2,8
Economic benefits	8	5 761	5.8	3	2 231	2.8
Events	5	5 546	3.6	2	733	1.8
Legal regulation	7	4 026	5.1	–	–	–
Unclassified	10	10 601	7.3	2	706	5.6
Total	**136**	**80 731**	**–**	**107**	**39 853**	**–**

The next dominant topic across the media is 'AI development and Investments'. The theme recurred frequently in the two types of the media, however, AI development receives twice as much attention in the popular press than in the business press, which means that it mostly focuses on the future scenarios of its implementation while the business-oriented outlets concentrate on the present achievements:

(17) «Сбер» **представил нейросеть** GigaChat. Она умеет отвечать на вопросы пользователей, поддерживать диалог, писать программный код. В отличие от ChatGPT нейросеть **генерирует** не только текст, но и картинки, а также более грамотно общается на русском языке (rbc.ru).

The texts are often associated with specific products or corporations and often mention companies involved in AI development, such as *Sber*, *MTC*, or *YandexGPT*. They take an informative stance, as an audience was mainly informed about an update, a change, or a new feature without taking a clear stance on the positive or negative implications for society or individuals. A small proportion of texts, about 4 per cent in each segment, covered related to AI industry promotional events, start-ups, investments, and conferences. However, they are mentioned twice as much in the business-oriented segment compared to the popular one; the latter raises the employment topic nearly twice as often.

Unique categories for each of the news outlets are 'Legal regulation' and 'Impending Danger'. The category 'Impending danger', which is characteristic of the popular press, includes articles that report potential dangers and disruptions that may be caused by AI technologies. These texts tend to emphasize the potential societal damage or severe consequences that may arise due to the unforeseen impacts of AI technologies. We see that dangers and threats arising from the AI implementation are among less important issues:

(18) Искусственный интеллект **обвинили** в усугублении климатического кризиса.

By contrast, 'Legal regulation' is in the focus of business oriented news outlets that report on legal initiatives, indicating the level of readiness for AI embracement.

Discursive strategies in AI media representation

Discursive strategies employed to construe AI in the public conscience and shape its perception by lay audiences include the following: *an explanatory strategy* that is used to build awareness of AI and help to experiment with it; *a prognostic strategy* that is used to construe future scenarios of AI implementation and the strategy of warning about negative consequences of AI development.

The texts employing the explanatory strategy use definitions of AI (19) or they instruct the reader how to use automation program, describe its capacity and warn about some limitations (20):

(19) Искусственный интеллект – **компьютерная программа, которая** принимает и анализирует данные, а затем делает выводы на их основе (kp.ru);

(20) Как пользоваться YandexGPT в России

Нужно запустить Алису и ввести запрос «Алиса, давай придумаем...». Это **работает** как в текстовом чате, так и при голосовом взаимодействии. После этого **помощник предложит перейти** в соответствующий режим.

На мобильных устройствах в него **можно** также **попасть**, **нажав** на кнопку «Давай придумаем» (rbc.ru).

The explanatory strategy draws on the antropomorphic metaphor when explaining the nature of AI and describing the principles of machine learning by comparing it to the acquisition of knowledge by young children:

(21) Ребенок в раннем детстве сначала **обучается** не конкретным задачам, а общим понятиям и представлениям об окружающей действительности, об ее устройстве. <...> При **обучении** нейронных сетей специалисты сталкиваются с похожими ситуациями. Если перед решением конкретных задач нейронные сети аналогично **обучить** на очень большом объеме данных восприятию основных, необходимых для осознания действительности изображений с целью **научиться** классифицировать представленные на них различные сцены – темные, светлые, внутри помещения, вне и т. п. (kp.ru).

The development of AI as a potentially revolutionary technology is not the first time in history that due to technology society is facing structural social changes. Whereas some texts

depict present AI applications or abilities, some texts tend to depict future AI abilities and applications by employing *a prognostic strategy.* As the previous section show, the texts often condition the future by using Future forms of the verbs.

As Table 5 shows, half of the texts contain references to future AI abilities or applications:

(22) Это концепция искусственного разума [(AGI – artificial general intelligence)], который **будет** способен решать любые задачи и соперничать с гениями (vedomosti.ru);

(23) Искусственный интеллект **будет** находить нарушения на предприятиях по обращению с ТКО (vedomosti.ru).

The prognostic strategy is used to shape alternative futures as consideration of probable or desirable outcomes. This strategy is maintained by the topoi of inevitability, necessity and competition, the three cornerstones of the media discourse, where texts employ voices of government officials and business representatives. The stance taken in AI news coverage implies the necessity of its development that is closely linked to the concept of security, competition and leadership:

(24) Пропасть в технологиях **становится** все больше. Почему развитие ИИ дает России шанс выиграть в мировой конкуренции? (lenta.ru).

The topos of necessity implies that embracing AI requires the formation of the environment that will facilitate the process and helps to avoid or reduce negative consequences of AI implementation. For instance, the quotation of the President of the Russian Federation emphasizes the necessity of AI development and implementation:

(25) на сегодняшний день развитие искусственного интеллекта – это **вопрос безопасности и выживания государства** (lenta.ru).

In the quotation the issue of AI development equals the issue of state existence, the resulting imagery of which is that of the savior. The topos of necessity is maintained by the use of words with the modal meaning of necessity (*нужно, необходимо,* необходимость, e.g., *необходимость формирования новой веб-экономики*; *необходимо усилить внедрение*; *необходимость обеспечения технологической независимости,* etc.).

The topos of inevitability are represented in the following examples:

(26) Герман Греф: искусственный интеллект **будет развиваться вместе с человеком** (kp.ru);

(27) Путин: искусственный интеллект **откроет новую главу истории человечества**. Глава государства подчеркнул, что предотвратить прогресс в этой области **невозможно**, поэтому следует обеспечить лидерство (kp.ru);

(28) За информационными технологиями будущее всего населения планеты. **Хотим мы того или нет**, но в течение всего нескольких ближайших лет искусственный интеллект существенно изменит и облегчит нашу жизнь (kp.ru).

The idea of inevitability is supported by phrases with the semantics of beginning, large scale and omnipresent implementation of AI technology, mentions of official documents and state programs for AI development, such as *начало массовой цифровизации, повсеместное внедрение «умных» технологий, программа «Цифровая экономика РФ» etc*. As we see, a highly interpretative flexible technology cluster like AI is transformed into a seemingly

Table 5. **The frequency and range of verbs in the future tense in the corpus**

Verb	AF/NF	Range	Range, %
будет	265 (2 197,64)	121/243	49,79
будут	137 (1 136,14)	83/243	34,16
позволит	62 (514,16)	49/243	20,16
смогут	49 (406,36)	37/243	15,23
сможет	37 (306,84)	28/243	11,52
поможет	29 (240,50)	24/243	9,88
помогут	13 (107,81)	11/243	4,53
принести	5 (41,46)	5/243	2,06
научится	3 (24,88)	3/243	1,23
покажет	2 (16,59)	2/243	0,82
принесут	1 (8,29)	1/243	0,41

inevitable and desirable technological pathway through the use of media narratives.

The corpus under study comprises the discursive strategy of warning about AI negative consequences that vary from frauds to existential threats:

(29) И пока достижения GPT берут на вооружение киберпреступники, специалисты **предупреждают**: искусственный интеллект может создать куда более **серьезные проблемы, угрожающие жизни на Земле** как таковой (lenta.ru).

However, the proportion of the texts containing a negative stance is relatively small and it is outnumbered by those that accolade the technology.

Conclusion

To sum up, the results of the study offer an initial picture on how recent technological advances in the fields of AI are communicated to the public in the Russian-language media narratives that has been constructed by intercepting quantitative characteristics of the texts, construing AI imagery in the Russian news media discourse, topic modelling dispersed across the media segments in the AI corpus, and discursive strategies in AI media representation.

The comparison of the quantitative characteristics of the business-oriented and popular media texts in AICorpus revealed close similarity on the length of the texts and their motivation. The major bulk of the texts is around 99–300 words (53.4%); their function is to inform readers about advancements in the field and prospects of AI use. Long texts (above 1301–2000 words, 6.2%) lean to an explanatory strategy, they are aimed at building awareness of the topic but not stimulating public discussions on AI social values.

The strategies employed to portray AI concept were discovered in the topical focus of the texts. The ten themes identified across the AICorpus provide a broad perspective on societal attitudes towards AI and its generative technologies, though seem not to drastically vary with the category of the newspaper outlet. Both types of media showed the preference for the themes of 'Positive Capabilities of AI' and 'AI Development'. Nevertheless, the discursive representations of AI tend to be more negative in the popular outlets as the articles employ the theme of 'Impending Danger' focusing on the negative consequences of AI implementation, while business-oriented press shows more preference for legal control, thus, implicitly recognizing fears projected on AI but depicting the fact that this risk is manageable. The analysis of the texts showed that they all establish AI as a given and massively favorable technical development that will change society and economy fundamentally. They stress the idea of equality and coexistence of AI and humans excluding the competition between them.

The analysis of discursive strategies in AI concept representations revealed that they establish AI as an inevitable and highly welcomed technological development by depicting AI as a competent solution to a range of societal problems. From our results, we can identify that there is a need for readers to seek greater explanation on what AI, ChatGPT, and LLMs are, given a small number of articles that employ the explanatory strategy. When visions around AI are announced in Russian news narratives, they are often embedded in a rhetoric of prospective potentials and emphasize that innovation involves inevitability, necessity and competition. Although AI seems to penetrate all spheres of life, Russian media outlets seem reluctant to articulate potentials, risks, and ethical challenges that go along with current AI developments. A small proportion of texts articulate that the AI implementation bears risks for human society; they raise the issue of security by drawing attention to the possibility of its use by fraudsters. It should be noted that, while the loss of jobs is mentioned in both types of media outlets, the articles emphasize the need for employees with competences in AI development. Thus, the Russia-language media texts embody the celebration of technological progress and conceal its problems and contradictions. These findings underscore the pivotal role of media discourse in shaping public perceptions of AI.

The study prompts reflections on news media practices in the Russian Federation and encourages future monitoring of the influence of social, cultural, and political contexts on AI concept representation during a period of technological change. This research provides relevant insights for policymakers, AI developers, and educators to support balanced public engagement with AI technologies.

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CONCEPTUALIZATION OF ARTIFICIAL INTELLIGENCE
IN RUSSIAN MEDIA DISCOURSE

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Abstract. The article focuses on the tendencies in artificial intelligence (AI) conceptualization based on the analysis of Russian media discourse. The conceptual, figurative and axiological features of AI as an abstract mental formation are identified. The conceptualization of artificial intelligence is shown to be represented in two directions: the ability of an artificial system to perform tasks that mimic human cognitive abilities and the science of modelling computerized intellectual behavior. The nuclear features of the concept with the key representation in the word combination *artificial intelligence* are recorded in lexicographic sources and special-purpose dictionaries; they constitute the basis for the conceptualization of artificial intelligence in media discourse. In the figurative-and-perceptual aspect, artificial intelligence is conceptualized as a living being endowed with physical characteristics and analytical abilities. Artificial intelligence is noted to be conceptualized in media discourse as an object of use, development, implementation, training, that performs a wide range of vital functions, and as a subject that demonstrates anthropomorphic characteristics (the ability to memorize, explain, analyze, etc.). The conceptualization of artificial intelligence in the value dimension manifests itself through positive assessment or possible harm. The utilitarian properties are evaluated positively, whereas the hypothetical impact on humans, in the case of uncontrolled headway in this area, is assessed negatively.

Key words: artificial intelligence, conceptualization, media discourse, concept, language means, syntactic models.

КОНЦЕПТУАЛИЗАЦИЯ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА
В РОССИЙСКОМ МЕДИЙНОМ ДИСКУРСЕ

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Аннотация. В статье описаны направления концептуализации искусственного интеллекта на основе анализа российского медийного дискурса. Определены понятийные, образные и ценностные признаки этого абстрактного ментального образования. Показано, что концептуализация искусственного интеллекта (ИИ) в понятийном аспекте осуществляется в двух направлениях: как способность искусственной системы выполнять задачи, имитирующие когнитивные способности человека, и как наука о моделировании интеллектуального поведения в компьютерах. Понятийные признаки концепта ИИ, ключевым репрезентантом которого является словосочетание *искусственный интеллект*, отражаются в словарных дефинициях толковых и специализированных словарей, формируя основу концептуализации ИИ в медийном дискурсе. В образном плане ИИ осмысливается как человек и наделяется свойственными ему физическими характеристиками и аналитическими способностями. Установлено, что в медийном дискурсе искусственный интеллект концептуализируется как объект использования, развития, разработки, внедрения, обучения, выполняющий широкий спектр жизненно важных функций, и как субъект, наделенный антропоморфными характеристиками (способность

запоминать, объяснять, анализировать и др.). Ценностное осмысление ИИ осуществляется с позиций пользы и возможного вреда. Положительно оцениваются утилитарные свойства искусственного интеллекта, отрицательно – его гипотетическое воздействие на человека в случае возможной неконтролируемости прогресса в этой области.

Ключевые слова: искусственный интеллект, концептуализация, медийный дискурс, концепт, языковые средства, синтаксическая модель.

Введение

Человечество находится на новом этапе развития глобальной цивилизации – этапе появления и функционирования новых способов деятельности и познания мира: роботизация, виртуализация действительности и разработка искусственного интеллекта. Вместе с тем идея наделить искусственным разумом неодушевленные предметы давно интересовала человечество. Прообразом современного искусственного интеллекта (далее – ИИ) стали искусственные создания, наделенные «разумом»: прислужницы и великан Талос (VIII в. до н. э., «Илиада» Гомера), Пандора (искусственная женщина, созданная Зевсом), механические куклы (I в. н. э., труды Герона Александрийского), автоматоны (мифы Древней Греции), бронзовые говорящие головы (создатель – Роджер Бэкон), механический флейтист (создатель – Жак де Вокансон). Эти прообразы заложили ключевые модели ролевого поведения ИИ (помощник, воин и др.).

В середине XX в. А.М. Тьюринг разработал концепцию вычислительной машины, обладающей безграничной по сравнению с человеком памятью и огромной скоростью обработки данных. В конце 1950-х гг. на конференции в Дартмутском колледже специалист по компьютерам и когнитивным наукам Дж. Маккарти ввел в научный оборот термин «искусственный интеллект», который стал использоваться в разных областях гуманитарного знания.

На протяжении последующих десятилетий произошло стремительное развитие сферы ИИ. Начиная с 2000-х гг. искусственный интеллект – это неотъемлемая часть жизни и деятельности человека, что выразилось в использовании смартфонов, голосовых виртуальных помощников и компьютеров, обладающих функциями ИИ.

На современном этапе ИИ играет ключевую роль в жизни общества, обладая высокой социальной значимостью. Развитие современных компьютерных технологий и расширение сфер их использования стало одним из приоритетных направлений социальной политики России и относится к ключевым факторам, определяющим приоритетные векторы развития страны, о чем свидетельствуют Указ Президента Российской Федерации № 490 от 10.10.2019 г. «О развитии искусственного интеллекта в Российской Федерации» и разработка «Национальной стратегии развития искусственного интеллекта на период до 2030 года».

Большой вклад в изучение специфики ИИ внесли российские философы, исследовавшие его сущность и способы контроля со стороны человека [Григорьев, Шеманов, Кириллов, 2020; Мурейко, 2009; и др.]. Ученые полагают, что ИИ не сможет функционально соответствовать человеческому сознанию, но сможет моделировать или имитировать его свойства [Аблеев, 2015, с. 59; Самохвалова, 2005, с. 65].

ИИ активно исследуется социологами, которые изучают механизмы его «одомашнивания» [Корбут, 2021], описывают основания сравнения феноменов человеческого сознания и ИИ [Резаев, Трегубова, 2021]. Теоретическому обоснованию сущности и структуры феномена ИИ посвящен ряд глубоких исследований [Алексеев, 2019; Булычев, Шутов, 2002; Быковский, 2002; Никитина, 2014; Пушкарев, 2015; Степаненко, 2006; и др.]. Идеи, сформулированные в этих работах, представляют интерес и для лингвистов, так как их понимание сущности ИИ способствует дальнейшему развитию сферы «человек – информационные системы».

Средства массовой информации активно вовлекают в медиадискурс концепты ин-

теллектуальной сферы. А.В. Олянич, например, выделил несколько концептуальных сфер, одной из которых – «Технологии». В нее исследователь включает концепты «компьютер», «виртуальная реальность», «телекоммуникации» и «хайтек» [Олянич, 2007, с. 68]. Сегодня мы можем пополнить этот ряд концептом «искусственный интеллект».

Лингвисты внесли значительный вклад в изучение искусственного интеллекта. Так, Л.А. Кочетова, исследуя влияние медиатехнологий на формирование образа ИИ, выявила метафорические модели восприятия обществом концепции ИИ (ИИ – это человек, ИИ – это война, ИИ – это враг) [Kochetova, 2023]. А.В. Городищев, С.В. Ускова, Э.В. Ходенкова описывают ИИ как инструмент обработки массивов языкового материала и средство оптимизации диалога между человеком и компьютером [Городищев, Ускова, Ходенкова, 2023]. Т.О. Шаврина изучает лингвистические методы оценки «интеллектуальности» англоязычных систем ИИ. Например, с помощью языковых моделей она оценивает вероятность употребления в тексте определенных фраз [Шаврина, 2021]. Е.Ю. Белозерова проанализировала ключевые лексические единицы, относящиеся к сфере ИИ, на материале новостного интернет-ресурса CNBC [Белозерова, 2023]. Предметом изысканий А.А. Клементьевой стало коммуникативно-грамматическое устройство научных, публицистических и официально-деловых текстов, в которых формируются различные представления об ИИ [Клементьева, 2022]. Исследователь отмечает, что модели ИИ не распознают оттенки значений слов, иронию, национальную специфику и культурные смыслы. Кроме того, А.А. Клементьева приходит к выводу, что для описания действий ИИ авторы используют акциональные глаголы физического, речевого и интерсубъективного действий лица или живого существа [Клементьева, 2022]. У.В. Смирнова обратила внимание на свойства субъектности, которыми наделяется ИИ в англоязычном медийном дискурсе. Она отметила, что в медиадискурсе сохраняется инструментальность, объектность ИИ по отношению к познающему субъекту и происходит метафорическое олицетворение ИИ как «помощника человека» [Смирнова, 2023]. Отечественные

лингвисты изучают главным образом особенности формирования образа искусственного интеллекта на материале англоязычных СМИ. Вместе с тем изучение и анализ лингвистических работ по поднимаемой проблеме показали, что, наряду с многочисленными интерпретациями феномена ИИ, проблема его концептуализации в рамках медийного дискурса не нашла полного отражения в научной литературе. Настоящее исследование направлено на получение дополнительных знаний по данному вопросу.

Материал и методы

Материалом послужили тексты российских СМИ, включенных в Перечень наименований (ПНР), зарегистрированных Роскомнадзором за период 2000–2024 годов. Примеры отбирались методом сплошной выборки из текстов, размещенных на новостных сайтах Российских телевизионных каналов (РБК, ВГТРК, НТВ, РЕН ТВ и др.) и интернет-изданий (Лента.Ру, ВЗГЛЯД.РУ, Газета.ru, Вести.ру, Ведомости и др.). Также использовались данные Национального корпуса русского языка, в частности газетного корпуса (НКРЯ). Всего проанализировано 5 000 примеров.

Работа выполнена с применением методов лингвистического анализа: контекстуального – для уточнения образных и ценностных признаков концепта ИИ на материале медийного дискурса; интерпретативного – с целью установления понятийных, образных и ценностных признаков рассматриваемого концепта, эксплицированных в текстовых примерах. Обращение к указанным методам способствует достижению цели работы – охарактеризовать направления концептуализации и репрезентации концепта ИИ в российском медийном дискурсе. Изучение феномена ИИ представляется важным для медиалингвистики, дискурсологии и лингвокультурологии. В основу работы положена методика изучения структуры концепта как многомерного образования, имеющего понятийную, образную и ценностную составляющие [Карасик, 2007, с. 25]. В ходе первого этапа исследовались лексикографические источники, в ходе второго – концепт «искусственный интеллект» в его дискурсивной реализации.

Результаты и обсуждение

Содержательные характеристики основных признаков концепта «искусственный интеллект»

Содержательные характеристики концепта ИИ были определены на основании анализа статей энциклопедических словарей и подтверждены данными результатов анализа статей толковых словарей, поскольку в значениях языковых единиц, как правило, находят отражение основные смыслы, формирующие толкование понятия в энциклопедических словарях. Результаты проведенного анализа позволили установить понятийные, образные и ценностные признаки, характеризующие исследуемый концепт.

Поскольку изучение искусственного интеллекта зародилось в англоязычной культуре, уместно обратиться к определению термина *artificial intelligence* (искусственный интеллект) в английском языке, поскольку именно этот термин дал имя концепту. В толковых словарях у этого словосочетания фиксируются следующие значения:

1) a computer program or system capable of reasoning in a manner regarded as equivalent to a human being (OALD, p. 49) – компьютерная программа или система, способная рассуждать так, как обычно это делает человек [1];

2) a system that uses automated reasoning to aid or replace a decision-making process that would otherwise be performed by humans (MWO) – система, использующая автоматизированное рассуждение для облегчения или замены процесса принятия решений, которые иначе выполнялись бы людьми;

3) a theory and development of computer systems capable of performing tasks that historically required human intelligence; the science of simulating intelligent behaviour in computers (MED) – теория и разработка компьютерных систем, способных выполнять задачи, которые исторически требовали человеческого интеллекта; наука о моделировании интеллектуального поведения в компьютерах).

Поскольку значение терминологического словосочетания *искусственный интеллект* отсутствует в Большом толковом словаре русского языка (БТСРЯ) и во многих других толковых словарях русского языка, мы используем данные современных словарей компьютерных технологий (СК; Т; ТСТПАИО). Анализ специализированных словарей показывает, что термин *искусственный интеллект* соотносится с двумя понятиями области информационных технологий: искусственная система и раздел информатики:

1) искусственная система, имитирующая решение человеком сложных задач в его интеллектуальной деятельности; кибернетическая система, моделирующая и воспроизводящая с помощью ЭВМ некоторые виды интеллектуальной деятельности человека; область исследований, сопровождающих и обусловливающих создание систем искусственного интеллекта (БЭПС, с. 405); искусственная информационная система, имитирующая решение человеком достаточно сложных задач в процессе его деятельности, использующая программно-аппаратные средства, позволяющие на основе применения знаний осуществлять решение неформализованных творческих задач, в том числе моделировать некоторые аспекты человеческой деятельности, включая процесс мышления (СК, с. 257);

2) раздел информатики, включающий разработку методов моделирования и воспроизведения с помощью компьютера отдельных функций творческой деятельности человека, решение проблемы представления знаний в компьютере и построение баз знаний, создание экспертных систем, разработку интеллектуальных роботов (Т, с. 295); направление современных научных исследований, сопровождающих и обусловливающих создание самих систем искусственного интеллекта, разработанных на базе электронно-вычислительной, микропроцессорной техники и предназначенных для восприятия, обработки, хранения информации, а также формирования решений по целесообразному поведению в ситуациях, моделирующих состояния различных систем (ТСТПАИО, с. 46).

В толкованиях термина *искусственный интеллект* акцент сделан на том, что это искусственно созданное техническое устройство, способное осуществлять сложные интеллектуальные действия.

Сравнительный анализ английских и русских словарных дефиниций показал, что понятийными признаками концепта, которые выражены во всех источниках являются:

1) способность компьютера или машины выполнять интеллектуальные действия, которые требуют участия разума;

2) раздел информатики, занимающийся созданием машин, выполняющих действия равные или превышающие способности человека;

3) имитация интеллектуальных способностей человека.

Итак, в понятийном аспекте ИИ концептуализируется в двух направлениях: как способность искусственной системы выполнять задачи, имитирующие когнитивные способности человека, и как наука о моделировании интеллектуального поведения в компьютерах.

Согласно мнению С.Г. Воркачева, в число важных характеристик концепта входят, помимо прочих, «ассоциативные характеристики имени концепта и его словообразовательная продуктивность» [Воркачев, 2002, с. 12].

Будучи абстрактной ментальной сущностью, концепт ИИ имеет образно-ассоциативную составляющую. Приведем данные русского ассоциативного словаря: *робот, нейронная сеть, разум, интеллект, компьютер, машина, программа, сознание, распознавание, ум, Спилберг, машина Тьюринга, фантастика, киборг, Тьюринг, сингулярность, робототехника, будущее, сверхразум, бот, машинное обучение, осознание, алгоритм, всемирная паутина, кибернетика, Илон Маск* (САРЯО). В онлайн-словаре ассоциаций русского языка приведены прилагательные, выступающие в качестве атрибутов существительного *интеллект*: *высокоразвитый, сверхчеловеческий, разумный, способный, умный, аналитический, логический, генеративный, сильный, развитый, опасный* (АС). В основе приведенных ассоциаций лежит идея наделения ИИ аналитическими способностями (*разум, интеллект, ум, сверхразум, умный, аналитический*), антропоморфными (*распознавание, осознание, сильный, опасный*) и техническими (*компьютер, машина, программа, бот, алгоритм*) характеристиками. Отметим, что подавляющее большинство ответов определялись положительными ассоциациями (*умный, способный, развитый* и др.). Единичными были реакции с отрицательной коннотацией (*опасный*).

Ценностные признаки концепта «искусственный интеллект» определены на основе анализа их объективации в медийном дискурсе, что будет показано ниже.

Дискурсивная актуализация концепта «искусственный интеллект»

Дискурсивная объективация концепта «искусственный интеллект» в российском медийном дискурсе происходит с помощью следующих вербальных средств:

1) ключевое словосочетание *искусственный интеллект* – 3 100 словоупотреблений (62 %), а также аббревиатура данного словосочетания (*ИИ*) – 280 словоупотреблений (5,6 %) и ее английский эквивалент (*AI*) – 150 словоупотреблений (3 %);

2) синонимичные номинации ИИ (*технология, система, искусственный разум, компьютер, нейросеть*) – 450 словоупотреблений (9 %);

3) сложные слова (*ИИ-художник, ИИ-копирайтер, ИИ-разработчик* и др.) – 350 словоупотреблений (7 %);

4) синтаксические модели: а) «глагол + номинации ИИ», посредством которой ИИ представлен как объект действия – 1 178 случаев (38 %); б) «номинации ИИ + глагол», посредством которой ИИ репрезентируется как субъект действия – 1 450 случаев (29 %); в) «номинации ИИ + модальный глагол с отрицанием + смысловой глагол», которая объективирует ИИ как субъект действия – 412 случаев (8 %);

5) предложные конструкции с существительным *помощь*, которые объективируют ИИ как инструмент действия – 837 словоупотреблений (27 %);

6) атрибутивные именные словосочетания (*сильный искусственный интеллект, слабый искусственный интеллект, сверхразумный искусственный интеллект*) – 103 словоупотребления (2 %).

Приведем примеры использования в российском медийном дискурсе указанных выше языковых средств, прежде всего ключевых слов:

(1) **Искусственный интеллект** создает музыку, сценарии и стихи. Теперь настала очередь фильмов? (Искусственный интеллект уже создает...);

(2) Компания Sonantik с помощью **AI** воссоздала голос артиста благодаря репликам из его старых фильмов (Вэл Килмер не мог...).

В следующих контекстах концепт «искусственный интеллект» актуализируется с помощью синонимичных слов и словосочетаний (*технология, система, искусственный разум, компьютерный разум, нейросеть*):

(3) **Нейросеть** показала, как будут выглядеть Москва и Санкт-Петербург в 2100 году (Нейросеть показала...);

(4) Текстовую ролевую игру AI Dungeon перевели на искусственный интеллект – в ней **компьютерный «разум»** полностью отвечает за повествование, взаимодействие с пользователем, создание диалогов и даже персонажей (ИИ научился создавать...).

Номинации *искусственный интеллект* и *нейросеть* используются взаимозаменительно:

(5) Каждый четвертый россиянин, который использует **искусственный интеллект**, создает с помощью **нейросети** изображения и текст (Аналитики узнали...).

Вместе с тем с технической точки зрения необходимо разграничивать понятия нейросеть и ИИ, поскольку нейросеть – это один из типов ИИ, ее функция – моделировать аналитические процессы, осуществляемые человеческим мозгом.

Сложные слова, используемые для объективации концепта ИИ, можно разделить на три тематические группы, исходя из лексического значения данных единиц:

– обозначение людей, занятых разработкой и обслуживанием ИИ (*ИИ-художники, ИИ-креатор, ИИ-разработчик, ИИ-разработчик нейронных сетей, ИИ-промпт-инженер, ИИ-инженер робототехник, ИИ-инженер ПО, ИИ-специалист по машинному обучению, ИИ-нейро-иллюстратор, ИИ-копирайтер*);

– обозначение сфер применения ИИ, на которые он оказывает влияние (*ИИ-искусство, ИИ-социология* и др.);

– обозначение объектов, создаваемых ИИ (*ИИ-аниме, ИИ-изображение, ИИ-картинка, ИИ-голос, ИИ-кавер, ИИ-логотип, ИИ-видео, ИИ-арт*).

Как указывалось, концепт «искусственный интеллект» объективируется с помощью синтаксической модели «глагол + номинации искусственного интеллекта», представляющей ИИ как объект действия, а именно – как управляемый объект. Приведем примеры:

(6) В России знают, как **использовать** искусственный интеллект в борьбе с раком (В России знают...);

(7) Крупные российские компании **внедряют** искусственный интеллект и создают собственные разработки (Искусственный интеллект в действии);

(8) Президент сказал, что необходимо расширить охват компаний с государственным участием, которые **используют** или планируют **задействовать** ИИ в своей работе (Искусственный интеллект будет играть...);

(9) Японская фирма Rakuten планирует **запустить** ИИ для повышения собственной операционной эффективности и оптимизации маркетинга (Японская Rakuten планирует...);

(10) Израильские ученые **разработали** искусственный интеллект для распознавания лжи (Израильские ученые разработали...);

(11) Ученые из России первыми **обучили** ИИ самоадаптироваться к новым действиям (Ученые из России первыми обучили ИИ...).

Искусственный интеллект выступает как продукт деятельности человека, руководствующегося желанием удовлетворить свои потребности и облегчить себе жизнь. Глаголы, используемые со словосочетанием *искусственный интеллект*, обозначают объект, над которым совершаются определенные действия: использование, разработка, внедрение, обучение (*ИИ применяют, ИИ используют, ИИ задействуют, ИИ разрабатывают, ИИ создают, ИИ внедряют, ИИ развивают, ИИ обучают*). В рассматриваемой модели стержневым семантическим признаком оказывается признак «вводить в практику, исследовать или развивать что-либо для какой-то цели, например, для активного распространения в быту или производстве».

ИИ концептуализируется в медийном дискурсе как инструмент выполнения действия в предложной конструкции со словом *помощь*:

(12) Студент написал диплом **с помощью** искусственного интеллекта (Цифровой скандал...);

(13) Какую работу можно автоматизировать **с помощью** ИИ? (Как зарабатывать на нейросетях...).

В анализируемом материале концепт «искусственный интеллект» объективируется с помощью синтаксической модели «номинации искусственного интеллекта + глагол», посредством которой ИИ репрезентируется как субъект действия:

(14) ИИ впервые в мире **солировал** на концерте во Владивостоке. ИИ от Сбербанка стал солистом и импровизатором. В рамках культурной программы Восточного экономического форума ИИ **импровизировал** в режиме реального времени. Нейросеть **стала участником** творческого процесса и **соавтором** композиции, так как **переосмыслила** симфонию, **изменила** ее и даже **дополнила** (ИИ впервые в мире солировал...);

(15) Искусственный интеллект **использует** данные с 40 тысяч камер системы «Безопасный регион» (Еще 15 тысяч «умных» камер...).

Глаголы, используемые со словосочетанием *искусственный интеллект*, обозначают широкий спектр физических, инструментальных, функциональных и интеллектуальных действий, присущих субъекту: глаголы созидательной деятельности (*создавать, сочинять, рисовать, решать, писать, солировать, генерировать*); глаголы интеллектуальной деятельности (*понимать, сравнивать, решать, осмыслить, обрабатывать, вычислять, запоминать*); глаголы познавательной деятельности (*учиться, обнаруживать, использовать*); глаголы физической деятельности (*работать*); глаголы качественного состояния (*развиваться, становиться*); глаголы социальной деятельности (*помогать, стремиться, принимать участие, управлять, бороться, контролировать*); глаголы социальных отношений (*влиять, менять, следить, обманывать*).

Субъектность объективируется с помощью глаголов, которые указывают, что ИИ может запоминать (*искусственный интеллект запомнил текст*), объяснять (*искусственный интеллект объяснил разницу между словами*), анализировать (*согласно анализу искусственного интеллекта, Ким Чен Ин весит более 140 кг*), обманывать (*искусственный интеллект обманул человека*), бороться (*искусственный интеллект борется с пропагандой в интернете*), вычислять (*ИИ вычислил победителя*), создавать (*созданная искусственным интеллектом фотомодель стала популярна в социальных сетях*). ИИ может выполнять действия, традиционно выполняемые человеком (*участвовать, обучаться, создавать*). Как и человек, ИИ может рисовать картины, писать музыку и стихи, выполнять иные интеллектуальные действия (*ИИ запоминает, ИИ создает*,

ИИ генерирует и др.). Так, на страницах газет встречаем:

(16) Искусственный интеллект DALLE **генерирует** изображения на основе текстового запроса (Посмотрите на картины...);

(17) Произведения искусства не впервые **создаются** искусственным интеллектом (Созданную искусственным интеллектом...).

Сходство ИИ с человеком выражается при помощи приписывания ИИ характеристик субъекта, при этом может имплицироваться и наличие у ИИ анатомических органов человека: органов зрения (*ИИ видит*), речевого аппарата (*ИИ говорит*), головного мозга (*ИИ запоминает*, *ИИ анализирует*), рук (*ИИ рисует*):

(18) Нейросеть создала впечатляющие рисунки. Такой искусственный интеллект **видит** Россию – молодой, мощной, суровой, но очень красивой (Если бы...).

Осмысление искусственного интеллекта как субъекта реализуется путем описания воздействия данной технической системы на развитие общества в плане его цифровизации. Приведем примеры, иллюстрирующие важность искусственного интеллекта как индикатора стремительного развития цифрового общества:

(19) Как искусственный интеллект **меняет** будущее медицины? (ИИ тебя вылечит...);

(20) Искусственный интеллект быстро входит в нашу жизнь и **меняет** ее (61% россиян считает...).

В единичных случаях использовалась модель «номинации искусственного интеллекта + модальный глагол с отрицанием + смысловой глагол», посредством которой ИИ представлен как субъект действия:

(21) Искусственный интеллект **не может** полностью заменить врачей, психологов и учителей (Искусственный интеллект не может...).

В синтаксических структурах, представляющих именные атрибутивные словосочетания, ИИ наделяется физическими (*сильный искусственный интеллект*, *слабый искусственный интеллект*) и интеллектуальными (*сверхразумный искусственный интеллект*) характеристиками:

(22) **Слабый искусственный интеллект** может заменить Стивена Кинга. Что он не сможет сделать, это создать какую-то личность, но он может сымитировать его стиль изложения (Что такое сильный...);

(23) Э. Юдковский, один из главных IT-экспертов современности, уверен, что **сверхразумному искусственному интеллекту** будет наплевать как на людей, так и на разумную жизнь в целом (Все умрут, включая детей...).

Обратим внимание на прилагательное *сверхразумный*, где префикс *сверх-* образует дериват со значением признака, который характеризует высшую степень качества, названного мотивирующим словом. Отметим, что в исследуемых контекстах атрибутивные сочетания выражают положительную оценку ИИ: *умный искусственный интеллект*, *полезный искусственный интеллект*.

Положительные характеристики, приписываемые ИИ, вариативны. ИИ положительно влияет на сферу строительства (проектирует сложные конструкции, создает «цифровые копии» сооружений, контролирует все процессы на стройке), здравоохранения (упрощает работу врачей, ставит диагноз, автоматизирует документооборот) и др. В то же время в медийном дискурсе указывается на возможное отрицательное воздействие ИИ на человека:

(24) Искусственный интеллект **может создать серьезные проблемы**, угрожающие жизни на земле (Все умрут, включая детей...);

(25) Искусственный интеллект и нейросети **могут нести угрозу** в том случае, если человек передаст им возможность управлять системами (Эксперт рассказал...).

В исследуемых контекстах используется большое количество предложений с глаголом в будущем времени (2 034 примеров, 40,6 %), что позволяет указать на предстоящие или прогнозируемые события:

(26) ИИ трансформирует сферу развлечений и **обещает увеличить** производительность труда во многих сферах (От медицины...).

Итак, концептуализация ИИ в ценностном аспекте проявляется как положительная и отрицательная оценка человеком утилитарных характеристик этого технического изобретения. Возможное отрицательное воздействие ИИ на человека прогнозируется в случае неконтролируемого прогресса в этой области. Высказываются опасения относительно того, сможет ли человек сдержать стремительное развитие искусственного интеллекта.

Заключение

Проведенное исследование показало, что концептуализация ИИ в российском медийном дискурсе осуществляется посредством объективации его основных признаков: понятийных, образных и ценностных. Понятийные характеристики концепта ИИ сводятся к наиболее важным признакам, зафиксированным в словарных дефинициях толковых и специализированных словарей, и выступают основой концептуализации исследуемого концепта в медийном дискурсе. Образные характеристики представляют ИИ как субъект, обладающий как физическими характеристиками, так и аналитическими способностями. В российском медийном дискурсе ИИ концептуализируется и как объект, наделенный инструментальными характеристиками и как субъект, наделенный антропоморфными характеристиками. В ценностном аспекте ИИ осмысливается участниками медийного дискурса с противоположных позиций: пользы или возможного вреда в случае отсутствия контроля за прогрессом в этой области.

ПРИМЕЧАНИЕ

[1] Здесь и далее перевод с английского наш.

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DIGITAL REPUTATION OF THE EXECUTIVE POWER BODIES: DISCURSIVE FACTORS AND COMMUNICATIVE TECHNIQUES OF MANAGEMENT [1]

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Abstract. The paper discusses the communicative techniques of reputation management of the executive power bodies in the Russian media space. Comparing the concepts of *digital reputation* and *digital image*, the authors argue that, unlike image which is purposefully implemented in the media environment, reputation reflects the internet users' real opinion about the activities performed by state institutions. The essential features of digital reputation are accumulative character, unpredictability and inertia. The authors define the discursive factors affecting reputation: ambiguously wide audience of the internet, distribution of target groups on different web sites, the unpredictability of users' assessments, some citizens' aggressive speech behaviour, etc. More than 2.5 thousand posts by the Ministry of Science and Higher Education of the Russian Federation published in the *VKontakte* social network and *Telegram* messenger were selected as the material for the research. The impact of content on the internet audience was evaluated with the ER_{post} rate at the Popsters service. The authors argue that effective techniques of digital reputation management are the following: communication on a particular internet platform with regard to its target audience, attractive hashtags, the tone of involvement with the interlocutor, rejection of formal style clichés, and some others. The discursive factors of new formal communication are established, and the techniques of managing governmental bodies' positive digital reputation are described.

Key words: digital reputation, digital image, executive power bodies of Russia, discursive factor, communicative techniques of management, digital reputation management.

ЦИФРОВАЯ РЕПУТАЦИЯ ОРГАНОВ ИСПОЛНИТЕЛЬНОЙ ВЛАСТИ: ДИСКУРСИВНЫЕ ФАКТОРЫ И КОММУНИКАТИВНЫЕ СПОСОБЫ УПРАВЛЕНИЯ [1]

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Аннотация. В статье рассматриваются коммуникативные способы управления репутацией органов исполнительной власти в русскоязычной медиасреде. На основании сопоставления понятий цифровой репу-

тации и цифрового имиджа утверждается, что в отличие от имиджа как целенаправленно внедряемого обра-
за власти репутация отражает реальное общественное мнение о деятельности государственных институтов.
Цифровая репутация имеет накопительный характер, обладает непредсказуемостью и инерционностью. К дис-
курсивным факторам, влияющим на репутацию, авторы относят неопределенно широкую аудиторию Ин-
тернета, распределение целевых групп по разным веб-площадкам, непредсказуемость оценок и агрессивное
речевое поведение некоторых подписчиков. Материал исследования – более 2,5 тысяч постов Министерства
науки и высшего образования России, размещенных в социальной сети «ВКонтакте» и в мессенджере Telegram.
Влияние контента на интернет-аудиторию определялось посредством коэффициента ER$_{post}$ в сервисе Popsters.
Установлено, что эффективными способами управления цифровой репутацией являются следующие: вы-
бор интернет-платформы с учетом ее целевой аудитории, привлекательные хэштеги, тональность заинтере-
сованного разговора с собеседником, отказ от клише официальной речи. Выделены дискурсивные факторы
новой официальной речи, и описаны средства формирования позитивной цифровой репутации органа го-
сударственного управления.

Ключевые слова: цифровая репутация, цифровой имидж, органы исполнительной власти России,
дискурсивный фактор, коммуникативные способы управления, управление цифровой репутацией.

Introduction

Since state institutions are required to ensure transparency and openness of their activity through media communication, the digital reputation has been gaining importance in the context of the digitalized dialogue between the executive bodies and citizens. Digital reputation is, in general terms, a poly-criteria-based evaluation of a particular object (for example, the activity of a state institution), which is formed in a media environment and reflects the opinion of a socially active part of internet users. Polycriteriality is associated with several evaluation bases, such as social attitudes, values, sociocultural stereotypes, personal motives, and the emotional sphere of the communication participants.

The digital reputation of the executive power correlates with the internet users' perception of the governmental bodies' activity. The perception is shaped through various sources of information: citizens' comments, website and blog content, subscribers' performance indicators in online communities, as well as other mass media in which the number of mentions of the governmental bodies is relevant. For this reason, contemporary humanities aim at a multi-aspect study of digital reputation management techniques (verbal, non-verbal, marketing) used by public authorities. Additionally, developing the techniques is imperative for shaping public opinion and maintaining trust in the executive. The digital

reputation of an executive power body (ministry, agency, administration, department, etc.) indicates the perception and evaluation by community members of the activity of the executive body in the sector they administrate: education, medicine, culture, transport, communal services, etc. Effective digital reputation management enables any governmental body to form and reinforce a favourable public opinion to achieve long-term success and sustainable development. The aforesaid determines the relevance of studying digital reputation as a performance indicator of the public authority.

Modern humanities represent a new approach to studying digital reputation within the framework of the integrative interdisciplinary approach involving findings from adjacent disciplines: philosophy, communication theory, information theory, management theory, discourse analysis, sociology, etc. [Ayusheeva, Soyfer, 2021; Borovikova, Rozanova, 2021; Botnar, Sizganova, 2020; Vokhidova, Savoskin, 2023; Efremov, 2022; Ilyicheva, 2021; Kurbangalieva, 2022; Lepina, 2023; Lisenkova, 2022; Okhapkina, Roganov, 2021; Petrusha, 2017; Rodina, 2022; Simonova, Agibalova, 2023; Sirotin, 2021; 2023; Spicheva, 2014; etc.]. The researchers emphasize that communication of the executive bodies in the media sphere becomes efficient in case they, first and foremost, provide the citizens with reliable information on the activities of the state governmental bodies and, secondly, if they do

publicity using a well-planned strategy. The latter implies the choice of a digital platform and informative content, thematic planning of the content and deciding upon the posting frequency according to seasonal trends.

The aim of our research is to identify effective communicative methods and techniques for any state governmental body's digital reputation management.

The tasks of the research are:

1) to define the concept of digital reputation as compared to the concept of digital image in relation to governmental bodies;

2) to identify extra-linguistic (discursive) factors that influence the digital reputation of the executive power bodies;

3) to carry out a comparative analysis of the official content created by the authorities in the *VKontakte* (*VK*) social network and the *Telegram* messenger in terms of identifying effective communicative techniques of digital reputation management.

The scientific novelty of the research is determined by systemising the current approaches to defining the concept of digital reputation, identifying key discursive factors that form digital reputation and describing communicative techniques to manage it.

Material and methods

The material under study comprises posts on the official page of the Ministry of Science and Higher Education of the Russian Federation in the *VK* social network and posts on the Ministry channel in *Telegram* messenger.

Using the continuous sampling method, we selected 2,539 samples, including 682 posts on the *VK* social network and 1,857 posts on the *Telegram* messenger, covering one calendar year (1 April 2023 – 31 March 2024). As the posts are in Russian, the authors had to translate the samples that are used in this article. Choosing the material, we considered the fact that, according to scientific observations, social networks and messengers 'are becoming the primary source of real-time operational information' [Baranov, Medyakova, Kislitskaya (eds.), 2021, p. 182], as well as the fact that the users of these web resources most actively participate in social life.

The research involved several stages of analysis. At the first stage we carried out an automated analysis of the material from the Popsters.ru service [Popsters...] with the aim to identify the marketing parameters of the posts. Of all the available metrics, we considered only the engagement rate (the ER_{post} metric), i.e. the rate of users' engagement with the published content. After that, we ranked the publications by the ER_{post}. In the final stage, we performed a discursive-stylistic analysis of the posts with high ER metrics, which we believe reveals effective digital reputation management techniques.

Discussion

Considering the controversial issue of distinguishing between the close but not identical concepts of 'digital reputation' and 'digital image', we can emphasize that a governmental body's *digital image* correlates with the speech activity of the body (the sender of the information). Meanwhile, *digital reputation* mainly arises from the feedback of internet users, conveying the perception of the content by the target audience. O.A. Mikhaylova and E.L. Shashmurina reasonably believe that the concept of image is associated with the idea of a purposefully created opinion, while reputation is formed unintentionally [Mikhaylova, Shashmurina, 2019, p. 93]. Other researchers share a similar view (see: [Baranov, Medyakova, Kislitskaya (eds.), 2021, p. 185]).

As for digital reputation (i.e. online reputation), O.A. Mityaeva assumes that it is associated with a set of evaluative perceptions of any organization by the internet target consumers [Mityaeva, 2022, p. 58]. The definition has several advantages that we agree with. Firstly, it focuses on the axiological aspect of digital reputation; secondly, it underlines that the discourse of internet users shapes reputation by itself; finally, it highlights the changeable and dynamic nature of reputation.

Researchers of the reputation phenomenon hold the widespread opinion that a single negative review or comment on the internet can seriously affect the reputation of the object of evaluation. To analyze the quantitative indicators of the digital reputation of a commercial organization, D.L. Kurbangalieva developed a technique for measuring the impact of assessments by the target

audience voiced in social networks. Based on the degree of influence on digital reputation, the author distinguishes two groups of factors: a) initial impact factors (likes, number of posts); b) profound impact factors (comments, reposts, subscriptions) [Kurbangalieva, 2018, p. 75]. Indeed, comparing the impact of the discursive factors, we conclude that reposts and comments make explicit, but not necessarily in a verbal way, assessment of the activity, thus largely contributing to the reputational enhancement. From our point of view, this conclusion also holds for the assessment of digital reputation of the executive bodies.

Although 'reputation is an elusive variable' [Kamshilova, Chernyavskaya, 2021, p. 50], it is vital for the executive bodies to gradually earn a digital reputation since it affects the loyalty of citizens to state institutions.

Considering all the factors, we can define the digital reputation of the executive as a multi-component indicator of state power. The indicator is formed in the media environment and reflects the opinions of socially active citizens. We assume that a digital reputation possesses a collective nature formed by the aggregate responses of internet users. These are reviews and comments on websites and blogs, mentions of some executive power bodies in social networks and messengers, and non-verbal reactions to publications.

Statistics about the activities of a governmental body, including the number of views its posts and publications receive, are the primary indicators of its reputation. We understand reputation as a relevant component of *the digital discourse of the executive power* (see: [Bazhenova, Shirinkina, 2023]).

Based on the review of the scientific publications and discursive and stylistic analysis of the material, we can identify the discursive factors which influence the perception of the Ministry of Science and Higher Education of the Russian Federation in society:

a) an indefinitely *wide audience* of internet users, mostly non-specialists in the administrative sphere of the executive;

b) *unstable* and *unpredictable* opinions of the users, including anonymous users and bots, causing *chaos* that paves the way for "nourishing" digital reputation;

c) *subjectivity* and *polarisation* in assessing influential figures' activities, *variability* of users' individual *preferences*;

d) *provocative speech behavior* of some internet users who, being confident in the impunity of their criticism, discredit certain actions of the authorities.

To conclude the above-mentioned, let us single out the main discourse-driven attributes of a *digital image* and *digital reputation* relevant to the executive bodies' activity.

Digital image is an image of a governmental body specially designed by PR specialists and purposefully implemented in the media environment. Positive images are created by explicit (external) means, such as corporate style, semantically meliorative language units, and illustrative materials emphasizing a public institution's success and high performance. Managing the image is relatively easy since it focuses on immediate results and favorable impressions. Managing digital images involves considering citizens' expectations, adjusting to their mentality and peculiarities of information perception, and using some techniques to make the image attractive (verbal, non-verbal, marketing, etc.). The general purpose of image management is to control the dissemination of information in the media environment on behalf of a governmental body.

An executive body's *digital reputation* is the public opinion about its activities based on feedback from internet users. Reputation is formed via interactions between an executive body and citizens, reflects the level of public trust in the power and has an accumulative nature. A good reputation is easy to spoil but hard to restore, as it is influenced by diverse factors ranging from political and economic to individual and psychological ones, which are difficult to foresee. Because of the spontaneity and time delay of any reputation, including digital reputation, effective management requires much effort, such as identifying adverse factors or using feedback communication to detect potentially negative impacts [Baranov, Medyakova, Kislitskaya (eds.), 2021, p. 268].

In communicative terms, linguistic components of a dialogue between the authorities and society deserve special attention since the speech patterns of the official content can both

promote and hinder the formation of the positive reputation of the authorities. Verbal communication is precisely the primary means of convincing citizens, shaping their public consciousness, maintaining a positive image of the state institutions, and managing their reputation, including the digital one. Language means, if chosen correctly, both influence the rational assessment of the authority and evoke positive emotions in addressees. Productive dialogue is not possible without a positive emotional response [Khazagerov, 2006].

The paper discusses communicative methods and techniques of digital reputation management. It presents the results obtained from the analysis of the empirical material – the content of the official public channels by the Ministry of Science and Higher Education of the Russian Federation.

Results

The analysis shows that various (verbal, non-verbal, marketing) means of influencing the addressee are used to form a positive digital reputation for a public institution in the media. In particular, these are the following:

– developing a content plan as a set of communicative strategies for a digital dialogue between the authorities and society, which takes into account the target audience of the internet platform;

– categorizing content by using *hashtags*;

– adopting *a selective* approach to the topic of publications;

– using a *convenient format* (division of cards, division of information in columns, sections, etc.);

– writing news in an *apprehensible* language;

– using various means of creating an *active dialogue*;

– avoiding *formal style cliches*;

– highlighting a *personality* as a principal character of the content;

– using *interactive* forms of communication (voting, polls, live broadcast, etc.);

– maintaining *interest* in interactions with interlocutors;

– utilizing *visualization techniques* (infographics, story photos, dynamic videos, etc.);

– *responding* timely *to comments and messages* from citizens.

Given the volume of the given paper is limited, we will focus only on some of the communicative techniques.

The content analysis proves that the contents and formats (ways of presenting material using the technical capabilities of certain platforms) of publications by the Ministry of Science and Higher Education in the *VK* social network and in *Telegram* messenger differ since the Ministry's posts aim to influence different target audiences. Posts on the *VK* social network address mostly students, young teachers and researchers, while those of *Telegram* messenger target the academic community and administrative apparatus of higher education institutions.

The differences in choosing topics and linguistic form of posts targeting various audiences become apparent in the hashtags, specific to each online platform. For instance, the *VK* hashtags intend to evoke pride in students for an alma mater and a sense of involvement in university life, as well as foster respect for science and renowned scientists. This finding is traced through some words (including slang words) belonging to the 'Student Life' thematic group: *student, teacher, teaching, science, uni* (*#myunistudentday, #sciencefamilyteaching, #facesofscience*, etc.). With the personal and possessive pronouns *we* (*#wearetogether*), *my* (*#myuni*), *our* (*#ourneurostudent*), the content focuses on the audience consolidation and the achievement of corporate unity. The plane of content proves that the information in the *VK* social network, addressed to students and young researchers, discusses educational and scientific issues and reports on events meaningful to this very target audience: a) All-Russian competitions, Olympiads, national awards and startups; b) forums, festivals and congresses; c) special courses and internships; d) changes in the Russian system of higher education; e) particular features of admission campaigns; f) interesting scientific facts and popular science projects.

The automated quantitative analysis of the *VK* material revealed that the highest engagement rate (26.6) was recorded with the post (https://vk.com/wall-167915299_19533) devoted to the online competition 'Our Neurostudent'. The average engagement rate of posts under the corresponding

hashtag is 4.1. All of the posts about this competition received 4,411 'likes', 22,605 comments and 1,971 reposts.

As for the *Telegram* channel by the Ministry of Science and Higher Education, the hashtags merely create an official image of higher education in Russia. In particular, names of priority development areas of science (*#priority2030*, *#importsubstitution*, *#technologyeconomy*, *#ecology*, *#internationalcooperation*, *#"Science"NationalProject*, *#uav* – unmanned aerial vehicles), and official abbreviations of universities (*#SUSU* – South Ural State University, *#TSU* – Tomsk State University) serve this purpose. The *Telegram* hashtags contain exclusively bookish, unemotional lexis to draw the attention of subscribers to the most essential aspects of the activities performed by the Ministry. In particular, official *Telegram* posts inform about: a) implementation of state educational programs; b) achievements of Russian scientists; c) appointments of university rectors; d) the construction and improvement of campuses; e) the events in which Minister V. Falkov participates.

In general, the topics of the Telegram posts are standardized reports, which, according to Russian legislation, must inform the society about the activity of the governing body. The strategy of the formal style communication does not correspond to the nature of social networks and digital channels. Therefore, it is obvious that the *VK* social network has a greater potential to influence public opinion, and thus a greater potential to form a positive digital reputation of the Ministry. Indeed, the audience reach of the *Telegram* channel is 1.5 times less (51.5 thousand subscribers) compared to the audience reach of the *VK* social network (77.6 thousand subscribers).

A difference in the number of internet users subscribed to the Ministry in the social network and the messenger, in our opinion, is due to the verbal attractiveness of the *VK* posts. The study showed that high engagement rate posts (from 2.00 to 26.55 in comparison with the average 0.31) utilize a variety of means facilitating a dialogue.

First of all, the viewers' attention is drawn by *headlines* designed in the form of sentences that imply *semantic deficiency*.

For example, the headline *You are in the semi-finals!* to the post about the semi-finals of the competition "Our Neurostudent" is characterized by vagueness, understatement, which encourages the addressee to turn to the text and read it to the end to understand to whom the message is addressed, which semi-finals are meant and which university reached the semi-finals.

By using a quotation, the headline encourages the addressee to learn who wrote these words:

(1) There was an unprecedented emotional lift, and it turned out that we could really take on the world (https://vk.com/wall-167915299_44552).

Headlines employ a question or question-answer technique to trigger the addressee's interest in the publication. It holds the readers' attention while reading to find the answer to the question posed in the headline. For example:

(2) Did you know that chlorine used in paper bleaching harms the environment? (https://vk.com/wall-167915299_44616).

Finally, headlines use *imperative speech acts*. In this case, it is explicated by an exclamatory sentence with an imperative, for example:

(3) Get your chance to become the main discovery of 2023 together with the Russian National Award "Student of the Year"! (https://vk.com/wall-167915299_41816).

The technique of semantic incompleteness of the statement for the headlines is in demand in the *VK* content of the executive as a means to control the addressee's attention. This type of headline seems to engage citizens in a dialogue with the authorities and make them full-fledged participants in communication. This is confirmed by the high engagement rate set by the Popsters.ru service for posts with such headlines.

Another dialogue technique that draws the addressee's attention to the content is call for an action, expressed in the *imperative form of the verb and located in the strong (final) position of the VK post*. For example:

(4) Read the cards for further details (https://vk.com/wall-167915299_17691);
(5) Return to the comments after taking the test and share your impressions (https://vk.com/wall-167915299_42774);
(6) Leave your favourite New Year songs in the comments - you may inspire someone to make a video clip or be inspired yourself < (https://vk.com/wall-167915299_43044).

Personalization of content by introducing a well-known scientist or an exciting teacher to the users encourages a dialogue between the executive and citizens in the *VK* social network. Personalities are shaped and presented to the target audience through quotes about their life, profession, universal values, etc. L.A. Artsimovich, physicist, O.B. Sirotinina, linguist, G.S. Lebedev, archaeologist, and others became heroes of such publications.

However, managing the digital reputation of a governmental body is not only about the topic of the post or the expressive verbal means used to attract the attention of the audience. A user-friendly format for presenting information is also of great importance. The choice of a format is closely related to the technology capabilities of the platform.

So, in the *VK* social network, publications are placed in the user's news feed among other news posts. Therefore, content managers for the Russian Ministry of Science and Higher Education insert colorful pictures, smileys and emojis to highlight the publications in the news feed to attract the audience. Thus, posts are displayed in various interactive forms (polls, quizzes, voting, cards, etc.). For example, users are immersed in the content either by exploring photos in a 'carousel' manner (i.e. a post with a certain sequence of photos or videos that can be scrolled through) or by taking part in some quizzes and polls.

One of the features of the *Telegram* design is the following: once a user is interested in a channel, they can immediately see the entire news feed. This is why there is no need for special ways of attracting the addressee's attention to certain publications. Therefore, the *Telegram* content design is undiversified (as a rule, a verbal block is accompanied by a photo or a video clip).

Analyzing the online platforms of the Ministry of Science and Higher Education we found that each of the platforms hosts both unique (non-repetitive) and duplicated content. Unique posts from *Telegram* messenger are characterized by a more formal tone, and the information is often presented in the style commonly referred to as 'from official sources'. The publications contain information about events with the participation of the Minister of Science and Higher Education held in the Ministry; events concerning appointments of rectors of higher education institutions and so

forth. The posts about scientific achievements are intended for a narrow circle of specialists and are presented in a formal language.

As a rule, the *VK* social network and *Telegram* messenger duplicate information about significant events in the life of Russian universities such as opening and developing new campuses, constructing new laboratories and lecture halls, making outstanding scientific discoveries, etc.

In the *VK* social network, an important means of forming a productive dialogue between the Ministry and users is timely feedback on the subscribers' comments and messages. Although the option to leave comments on posts is disabled in *Telegram* messenger, the engagement rate is measured by the number of views, reposts and likes. In our opinion, it seems complicated to manage the Ministry's digital reputation since users cannot leave verbal comments.

In the framework of our research, there arises a question of what mostly influences the addressee: the topic or the speech pattern of the posts? Preliminarily, we can state that there are periodic fluctuations in the demand for certain information topics depending on seasonal, socio-cultural and other factors. For example, holiday greetings in the name of V. Falkov, Minister of Science and Education, are invariably at the top of the engagement rate. However, the greeting texts are not particularly creative.

Dependent on content distribution and subscribers' target groups, the effectiveness of communicative techniques requires further research. Regarding our material, the following principle has been revealed: the *Telegram* messenger posts conform with the conventions of 'dry' formal register. For example:

(7) The research of scholarship applicants should be based on the priorities defined in the Strategy for Scientific and Technological Development of the Russian Federation (https://t.me/minobrnaukiofficial/7781);

(8) The principles of interdisciplinarity should be preserved in the implementation of basic higher education programmes with 4 to 6 years of training, and practice-oriented approaches to training should be strengthened (https://t.me/minobrnaukiofficial/4469);

(9) Scientific infrastructure of the "megasciences" class – a network of modern large installations necessary to ensure breakthrough research in the most important areas of science in the Russian Federation (https://t.me/minobrnaukiofficial/7408).

As we can observe, the above statements are dominated by stylistically colored words and phrases typical of formal style (*scholarship applicants, priorities, scientific and technological development, principles of interdisciplinarity, practice-oriented approaches*, etc.). This feature can be attributable to the fact that the *Telegram* target groups are university administrative boards and older representatives of the academic community, whereas the *VK* social networking service of the Ministry targets students, postgraduates and young researchers.

Conclusion

The comparative analysis of the concepts of 'digital reputation' and 'digital image' in relation to governmental bodies confirmed the assumption that they are not identical. *Digital image* as an image of a public institution in the media environment is the result of the purposeful activity of PR-service specialists. *Digital reputation* is a multiple criteria indicator that reflects the evaluation of the government's activities performed by the socially active part of the population. As digital reputation is formed in the discourse of internet users (in reviews, comments, likes, reposts and other types of responses), it demonstrates, on the one hand, a collective and accumulative character; on the other hand, it is unpredictable.

The extra-linguistic, discourse-driven features of digital reputation identified in the study determine the complexity of its management and accentuate the need to develop a holistic system of actions. The content plan for digital reputation management should consider the communicative strategies of influencing target groups, considering the technical capabilities of internet platforms.

Based on discourse and stylistic analysis and content analysis of the publications posted by the Ministry of Science and Higher Education of the Russian Federation on the social platforms *VKontakte* and *Telegram,* and the ER_{post} metric data, the study draws a number of conclusions.

The study revealed the following features of posts that have a significant impact on citizens' evaluation of the governmental bodies' activities: relevance of the topics to the target audience; attractiveness of hashtags; capacity of headlines to hold the addressee's attention; use of dialogue

techniques; tone of friendly communication; and personalisation of content.

Convenient and attractive formats of posts (cards, carousel, videos, polls, quizzes, voting, etc.), as well as the options to repost and leave comments, contribute to involving citizens in the dialogue with the authorities.

The examined characteristics of publications in the media environment facilitate positive evaluation of the authorities' activities, so they can be considered effective techniques of public institutions' digital reputation management.

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МОДЕЛИРОВАНИЕ ПАРАМЕТРОВ ТЕКСТА ДЛЯ РАЗРАБОТКИ СИСТЕМ ИСКУССТВЕННОГО ИНТЕЛЛЕКТА

EXPERIMENTAL METHODS OF EXPLORING MULTIMODAL DISCOURSE: CROSSMODAL ALIGNMENT [1]

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Abstract. The study advances Crossmodal Alignment Framework to explore multimodal discourse in its three formats – semiotic, communicative and perceptive – via multimodal experiment. It considers the alignment patterns obtained from two semiotic modes (text and image), transferred in two communicative modes (speech and gesture), sensed by two perception modes (visual and audial). The common research framework determines the patterns as modulated by discourse tasks. The study features the results of multimodal experiments with the participants engaged in three discourse tasks: 1) receptive, which presumes obtaining information from text and image stimuli; semiotic alignment patterns are identified indirectly via participants' gaze response; 2) productive, in which the participants communicate the information in monological format; communicative alignment patterns are identified directly via their speech and gesture; 3) receptive-productive, which presupposes the participants perceive information visually and audially; alignment patterns are identified directly via participants' gaze behavior contingent on the stimuli areas of interest and indirectly via their speech response. Data analysis allows to determine and scale the degree of crossmodal alignment to discourse tasks, which helps identify the input of each mode to solving these tasks. The research framework and obtained results contribute to further development of multimodal discourse methods.

Key words: multimodal experiment, crossmodal alignment, discourse task, information construal, semiotic mode, communicative mode, perceptive mode, alignment patterns.

ЭКСПЕРИМЕНТАЛЬНЫЕ МЕТОДЫ ИССЛЕДОВАНИЯ МУЛЬТИМОДАЛЬНОГО ДИСКУРСА: КРОСС-МОДАЛЬНАЯ АДАПТАЦИЯ [1]

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Аннотация. Исследование нацелено на разработку методологии кросс-модальной адаптации для экспериментального изучения мультимодального дискурса в трех форматах его реализации: семиотическом, коммуникативном и перцептивном. Изучению подвергаются особенности конструирования дискурсивной информации, получаемой из двух семиотических модальностей (текста и изображения), транслируемой двумя коммуникативными модальностями (речи и жеста), воспринимаемой двумя перцептивными модальностями (визуальной и слуховой). Общее методологическое решение для их анализа заключается в установлении моделей адаптации этих модальностей к дискурсивным задачам. Материалом являются результаты трех экспериментов, в ходе которых участники решали три дискурсивные задачи: 1) рецептивную – извлечение информации из текста и изображения; оценка адаптации осуществлялась через отклик на нее в глазодвигательном поведении; 2) продуктивную – передачу информации в монологической коммуникации; оценка адаптации осуществлялась с помощью речи и жеста; 3) одновременно рецептивную и продуктивную – передачу информации, извлекаемой визуально и на слух; оценка адаптации осуществлялась в глазодвигательном поведении, сопряженном с зонами интереса стимула, и в речи – через коммуникативную модальность, смежную со слуховой перцептивной модальностью. Анализ полученных данных позволяет установить и ранжировать степень кросс-модальной адаптации к дискурсивным задачам, что в свою очередь определяет роль каждой модальности в их решении. Полученные результаты вносят вклад в развитие мультимодальной дискурсологии. Методология кросс-модальной адаптации разработана М.И. Киосе; эмпирические результаты получены и обработаны М.И. Киосе (рецептивная задача), В.О. Потехиным (продуктивная задача), О.Д. Зубковым (рецептивно-продуктивная задача).

Ключевые слова: мультимодальный эксперимент, кросс-модальная адаптация, дискурсивная задача, конструирование информации, семиотическая модальность, коммуникативная модальность, перцептивная модальность, паттерны согласования.

Introduction

Multimodal studies offer insights into exploring different types of modes. The first direction developed mostly in Systemic Functional Linguistics addresses the use of semiotic modes analyzing both verbal and nonverbal means of communicating information [van Leeuwen, 2022]. The second direction relates to the application of communicative modes like speech and gesture [Cienki, Iriskhanova, 2020; Iriskhanova, 2021] appealing to McNeill's theory of growth points [McNeill, 2006] which reveal the cognitive nature of interaction in communicating information. The third direction, which is less considered, explores the alignment of perceptual modes, mostly aural and visual in information intake [Divjak, Milin, Medimorec, 2020]. These three directions are commonly

developed independently due to different nature of modes. Meanwhile, experimental studies of multimodal discourse face an urgent need to consider the interrelation of different mode types, i.e. crossmodality. Until recently, the methods to explore the crossmodal alignment have been developed to solve single research tasks [Keller et al., 2023], which means that the procedure applied in one research case cannot be adopted to deal with another case. We presume that advancing a common research framework to explore the alignment of different mode types can solve the problem on a systemic basis.

The assumption which underlies Crossmodal Alignment Framework is that mode alignment is dependent on the discourse tasks which conceptionally and pragmatically motivate it and which consequently may serve as the growth points [McNeill, 2006] driving information construal. Their discourse markers in speech and gesture can be directly observed in communicative behavior which allows to determine the alignment patterns. Meanwhile, the alignment of semiotic and perceptual modes or of perceptual, semiotic and communicative modes cannot be observed in this way. In [Divjak, Milin, Medimorec, 2020], for instance, the gaze behavior of experiment participants was observed contingent on the three areas of interest on the stimulus, while the participants were subjected to aurally presented information. In this case, the alignment was attested by using the gaze behavior metrics (rather, its changes), mediated by event construal in aurally presented language and in the visually presented stimulus, which means that the alignment of visual perceptual mode with aural perceptual mode was attested indirectly via communicative mode (speech). Similarly, in [Kiose et al., 2023] the

alignment of semiotic modes, text and image was explored via the foregrounding features in event construal which mediate the gaze behavior of the viewers, thus in this case semiotic alignment was attested indirectly via perceptual mode. In [Chernigovskaya, Petrova (eds.), 2018] the results of multiple experimental studies are presented, where the participants' gaze behavior served to identify the alignment of text and image grounded on specific language features and specific features of image like colour and shapes.

These observations allow to claim that crossmodal studies presume that information construal is multi-directional, representing information and perceiving it, or representing, perceiving and communicating (transferring) it, which means that in case information construal is bidirectional or multidirectional, we can identify the crossmodal alignment patterns only indirectly, via a concomitant mode. Consequently, alignment identification can be explored in different discourse tasks aimed at receiving/obtaining information and producing/communicating/transferring it. This observation serves to create the common research framework for crossmodal experimental studies. In Table 1 we present the discourse task dependent on Crossmodal Alignment Framework which allows to explore both direct and indirect alignment patterns in experiments.

In this study, we address three types of multimodality in the experiments where the use of modes is stimulated by a discourse task – receptive, productive and receptive-productive. We expect that an integral view of multimodal experimental research developed in Crossmodal Alignment Framework will allow to determine and scale the multimodal alignment patterns in semiotic, communicative and perception modes.

Table 1. **Crossmodal Alignment Framework**

Multimodality type	Identification regime	Discourse task	Mode types	Examples of modes
Semiotic multimodality	Indirectly	Receptive	Via perception mode	Gaze behavior
		Productive	Via communicative mode	Speech, gesture, dance, drawing
Communicative multimodality	Directly	Productive	Via communicative mode	Speech, gesture, dance, drawing
	Indirectly	Receptive-productive	Via semiotic mode	Text, stative image, dynamic scene
		Receptive	Via perception mode	Gaze behavior
Perceptual multimodality	Directly	Receptive	Via perception mode	Gaze behavior
	Indirectly	Receptive-productive	Via semiotic mode	Text, stative image, dynamic scene
		Productive	Via communicative mode	Speech, gesture, dance, drawing

Materials and methods

To verify the Crossmodal Alignment Framework, we use the data obtained in three experimental studies testing semiotic, communicative and perception multimodality in receptive, productive and receptive-productive discourse tasks.

Experiment 1. Receptive discourse task

In Experiment 1 we determined the patterns of semiotic alignment in text and image areas of interest via the gaze behavior. Fifteen students were instructed to examine five stimuli on the computer screen (each stimulus for 15 sec, SMI red-x eye tracker was applied) and then to present a detailed account on the extracted information during the next 30 sec (blank page was demonstrated on the screen); therefore, they were subjected to a receptive task followed by a productive task (not related here). We presumed that in a receptive task the participants might be attracted to most foregrounded features of the stimuli, therefore, we addressed the typologies of foregrounding cues [Iriskhanova, 2014; Kiose et al., 2023]: 1) verbal mode cues of Graphic and orthographic foregrounding and Linguistic foregrounding, 2) pictorial mode cues of Foregrounding in image technique and Foregrounding in image colour.

Figure 1 manifests a fragment of stimulus 6[2] which was segmented into text areas of interest AOI 001 – AOI 007 and image areas of interest AOI 014 – AOI 018.

In terms of Graphic and orthographic foregrounding in text, all text AOIs are in capital font, in AOI 3 the word stress is additionally introduced, AOIs 1–3 contain non-standart orphography in *Тимофеича*, *Мокеича*, *Патрикеича* (intead of *Тимофеевича*, *Мокеевича*, *Патрикеевича*), AOIs 1 and 5 start with an interval, all AOIs apart from AOI 3 contain punctuation marks. In terms of Linguistic foregrounding, AOIs 2, 3, 6, 7 are phonetically foregrounded containing rhyming words. Morphological and lexical foregrounding is observed in several cases. AOIs 1–3 contain proper names, AOIs 1–3 manifest occasional word formation (which complies with non-standart orphography), AOIs 1, 2, 3, 5, 7 manifest different types of code-shifting (shifting to professional military terminology in *мобилизация*, *стан*, shifting to personalization by using proper names for animals). AOIs 4–7 manifest the use of expressive language and lexical tropes in *поселян* (archaic word), *мобилизация* (metaphor), *нация* (metaphor), *военный стан* (metaphor). Syntactic foregrounding is observed in the use of mononuclear sentences and coordinate terms. In terms of Foregrounding in image, AOI 14 manifests object detalization and intense colour regime, while AOIs 15–17 do not.

Overall, 15 verbal mode cues of Graphic and orthographic foregrounding and 13 verbal mode cues of Linguistic foregrounding in text AOIs were attested. In image AOIs 11 pictorial mode cues of Foregrounding in image technique and 6 pictorial mode cues of Foregrounding in image colour were attested. To explore the effects of foregrounding cues onto the gaze behavior, the gaze measures Fixation Duration and Pupil Dilation were considered since the first is affected by information processing and
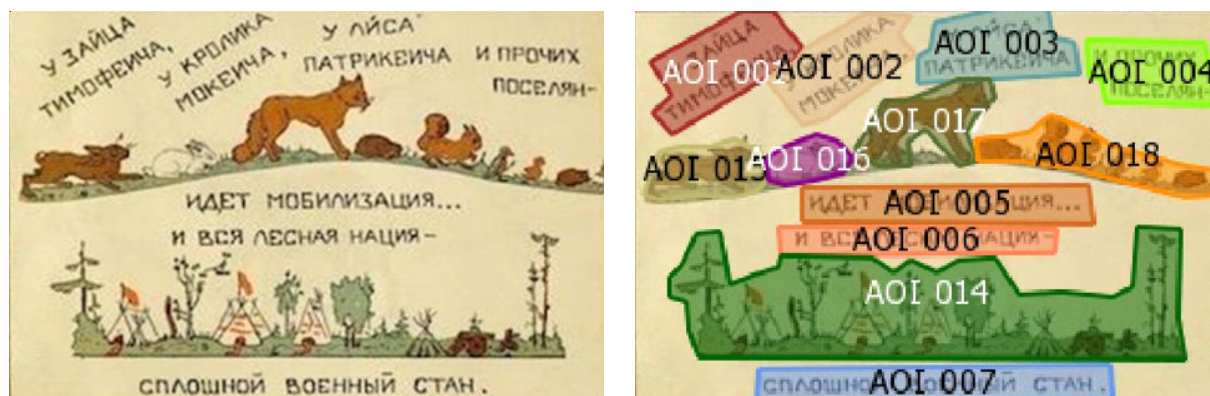
Fig. 1. AOI segmentation. Stimulus 6 (fragment)

the second with attention distribution [Chernigovskaya, Petrova (eds.), 2018; Prokofyeva, 2018; Kutlubaev et al., 2023]. Therefore, we identify the alignment patterns scaling the effects of semiotic foregrounding cues in text and pictorial stimuli areas of interest onto their gaze perception.

Experiment 2. Productive discourse task

In experiment 2 we directly determined the patterns of communicative alignment in speech and gesture. We collected film footages of multimodal behaviour elicited from 22 subjects (participants' written consents to use their image, video and behavioral data in scientific publications were obtained), transcribed and annotated for speech and gesture. The visual stimulus (VR-augmented dynamic scene based on themes of Van Gogh's "Starry Night" and "Bedroom in Arles") allows for information construal in three deictic dimensions: temporal deixis concomitant with narrative discourse passages, spatial deixis concomitant with descriptive discourse passages, and personal deixis concomitant with expository and argumentative discourse passages. During the productive phase of the experiment, the subjects (no longer exposed to the stimulus) were instructed to relate their watching experience to an interested partner. To identify the presence of a narrative, we used the discourse schemata of this type [Mandler, Johnson, 1977], which are setting, initiating events, characters' goals, attempts towards goals, and outcomes. Description is characterized by such discourse schemata as [MacSaveny, 2010] description/explanation, background information, elaboration, exemplification. Schemata typical of exposition warrant reason and come down to [Nippold, Scott (eds.), 2010] viewpoint formulation,

viewpoint presentation, compare – contrast, cause – effect, and problem – solution. Argumentation necessitates justification with the following set of discourse schemata [van Eemeren, 2010]: standpoints at issue, starting points of discourse, argument advance, and outcome presentation. For instance, the narrative discourse schema ATTEMPTS TOWARDS GOALS can be manifested in verbs denoting movement, as in *потом мы **повернулись**, но вовнутрь мы **не возвращались** // afterwards **we turned around**, but **never got back** inside*; the use of a rhetorical question can introduce the expository schema VIEWPOINT FORMULATION as in ***Как они называются?..** ээ.. ну, спинки кровати... // **What do you call it?..** Hmm.. you know, the back of the bed...*

In terms of gesture, we considered four gesture functions as outlined in [Iriskhanova et al., 2023]: pragmatic (discourse structuring), representational (denoting shape, size, form), deictic (denoting direction), and adaptive (self-oriented movement). Figure 2 shows the co-occurrence of speech and gesture during the delivery of the discourse task by the subject.

We directly explore speech and gesture behavior (communicative multimodality) modulated by the discourse task of information transfer in monologue communication. Since narration is used to relate events, places, and characters, typically it is representational gestures that are found to be more frequent in accompanying narrative passages. We also expect adaptors to accompany instances of discourse hesitation frequently concomitant with relating expository and argumentative passages [Iriskhanova et al., 2023]. Therefore, in the present experiment we expect to scale discourse task effects onto gesture production specifying gesture types distribution.

Gesture: deictic

Speech: *мы вылетаем из комнаты и движемся к небу / we're flying out of the room and are moving towards the sky*

Fig. 2. Deictic gesture with the ATTEMPTS TOWARDS GOALS narrative discourse schema

Experiment 3. Receptive-productive discourse task

In experiment 3, we determined the patterns of perceptual alignment in visual and aural modes to a certain degree via the semiotic mode (areas of interest in the stimulus) and via communicative mode (speech produced on perceiving aurally presented information). The participants were engaged into a professional activity of remote simultaneous interpreting implying both comprehension and production [Keller et al., 2023] which is a highly demanding receptive-productive discourse task [Cienki, Iriskhanova, 2020; Gavrilenko, 2023]. Fourteen participants were subjected to the task with a visual stimulus present which adds an extra layer for information processing in interpreting [Yuan, Wang, 2023] (SMI red-x eye tracker was applied). The visual stimulus was a simulated popular science conference given via Zoom videoconference application with the overarching topic of "Green energy". Three areas of interest (AOIs) [Divjak, Milin, Medimorec, 2020] were identified on the screen: the speaker's head (for facial expressions), the Powerpoint presentation (for visual information, such as numbers, proper names, etc.) and the interpreters head, simulated via a small standing mirror placed in front of the monitor (Fig. 3).

Apart from the gaze duration in areas of interest in the visual stimulus, we attest post-hoc discourse modifications in speech (by contrasting the discourse structure of original text and interpreting text) following aurally/audially perceived information. To scale the aural effects in post-hoc discourse modifications in speech, we presume that aural perception is modulated by the productive discourse task the interpreter performs, which is preserving the information in discourse. Therefore, aural perception is explored indirectly via a contingent communicative mode of speech. Higher frequency of discourse modifications in speech signifies that aurally perceived information appears less significant for the interpreter. Applying W.L. Chafe's theory of "information packaging" [Chafe, 1976], we identified seven types of interpreter discourse modifications in speech, which can then be subdivided into two groups: the first comprises "Shift Changes": 1) "New versus Old"; 2) "Contrast Focus"; 3) "(Un)certainty"; 4) "Subject"; 5) "Topic as Context"; 6) "Perspective"; the second group includes: 7) "Omissions". In *...a variety of industrial applications, **like water desalination, enhanced oil recovery, food processing**, and so on and so forth* = *...может помогать **очищать воду от соли** и **в других целях*** – the interpreter, instead of listing the homogenous elements of an original phrase, relates one of the positions and then generalizes the rest. In ***This heat** – also known as **thermal energy...*** = *Эта **термальная энергия**, или **отопление...*** – the interpreter switches the order new and old information is presented in, which is supposedly done in order to evade a pause: this reversal served as a way for the participant to "find" the required equivalent in Russian.

Analyzing the eye and speech behaviour patterns leads us to hypothesizing a potential correlation between the three AOIs when it comes to gaze dwell time and speech modifications. Since we analyze contingency indirectly through two
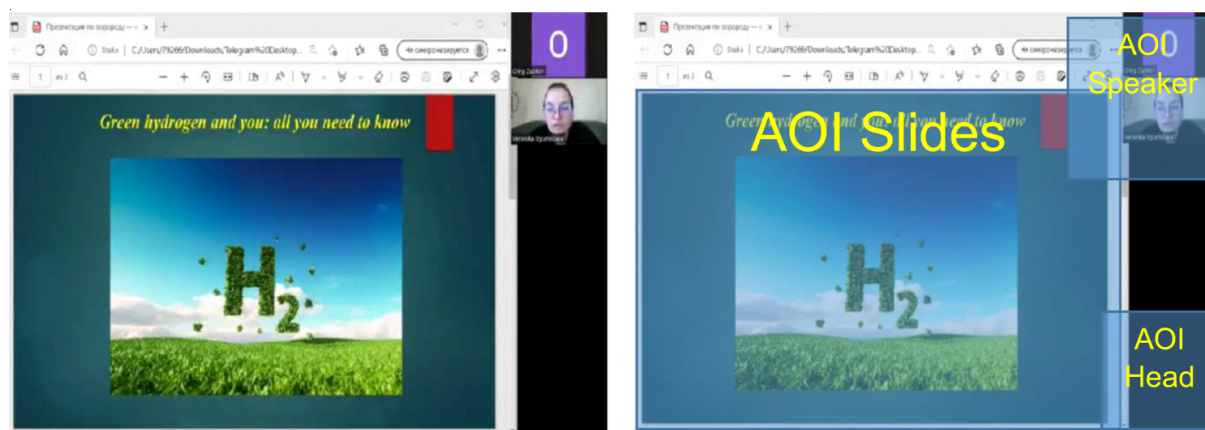
Fig. 3. AOI Segmentation

contingent modalities at once – through semiotic (AOIs) and communicative (speech production), a lower correlation result is to be expected.

Results and discussion

In this section, we present the results of three experimental studies determining the scales of crossmodal alignment of semiotic, communicative and perception modes in receptive, productive and receptive-productive discourse tasks.

Experiment 1. Receptive discourse task

To identify the foregrounding effects of each semiotic modality onto gaze perception, we used two gaze measures, pupil dilation known to be sensitive to perception foregrounding effects and fixation duration known to be sensitive to information retrieval effects [Chernigovskaya, Petrova (eds.), 2018; Kutlubaev et al., 2023]. We observed visible differences in pupil dilation with higher dilation in image areas and higher fixation duration in text areas. In Text, Average Pupil dilation is 2.78 mm, Average Fixation Duration is 159 ms. In Image, Average Pupil dilation is 2.95 mm, Average Fixation Duration is 152 ms.

To establish the effects of (1) verbal mode cues of Graphic and orthographic foregrounding and Linguistic foregrounding, (2) pictorial mode cues of Foregrounding in image technique and Foregrounding in image colour, onto pupil dilation and fixation duration, we performed one-way ANOVA tests separately for text and image AOIs (Table 2).

We observe a significantly larger number of graphic and orthographic foregrounding affecting pupil dilation which allows to presume that these cues relate to information perception rather that to information retrieval. A small number of linguistic foregrounding cues mediating pupil dilation suffices to presume that these cues do not produce steady increase on pupil diameter size since they do not mediate perception. Importantly, out of 11 Pictorial mode cues of Foregrounding in image technique and 6 cues of Foregrounding in image colour none was found to modulate fixation duration, whereas 4 cues of the first type affected pupil dilation. To scale the effects, we contrast the Kruskal – Wallis χ^2 and *p*-values and range them from higher (manifesting higher correlation) to lower. The scaled effects are established as follows:

Foregrounding in text via pupil dilation: Graphic and orthographic foregrounding

Foregrounding in image via pupil dilation: Foregrounding in image technique > Foregrounding in image colour

Foregrounding in text via fixation duration: Linguistic foregrounding

Foregrounding in image via fixation duration: None

Table 2. **Results of the one-way ANOVA (Foregrounding cues in text and image and gaze behavior)**

Gaze measures	Fixation Duration Kruskal – Wallis χ^2 [df; p]	Pupil Dilation Kruskal – Wallis χ^2 [df; p]
Foregrounding cues Graphic and orthographic foregrounding	use of brackets and inverted commas 5.17 [713; 0.023] first letter capitalization 4.32 [713; 0.038]	use of italics 16.9 [713; <.001] use of brackets and inverted commas 4.27 [713; 0.039] capitalization of a word 3.65 [713; 0.05] non-standard orthography 4.55 [713; 0.033] use of interval 13.6 [713; <.001] exclamation or question mark 13.2 [713; <.001]
Linguistic foregrounding	use of proper names 6.33 [713; 0.012] use of expressive language and lexical tropes 3.63 [713; 0.057]	code-shifting 16.6 [713; <.001]
Foregrounding in image technique	None	collage technique 6.89 [625; 0.009] non-standard technics 6.17 [625; 0.013] non-standard stylistics 6.91 [625; 0.009] style modulation 4.52 [625; 0.033]
Foregrounding in image colour	None	classical triad colour spectrum 6.91 [625; 0.009] colour symbolism 8.97 [625; 0.003] colour effects 4.4 [625; 0.036]

The results manifest that while fixation duration is mostly susceptible to linguistic foregrounding, the pupil dilation responds to perception cues in both text and image. This serves an additional evidence of pupil dilation modulated by perception, attention distribution and general activation [Kutlubaev et al., 2023], and indirectly proves that gaze event duration responds to cognitive linguistic construal which underlies the use of linguistic foregrounding [Kiose et al., 2023].

Experiment 2. Productive discourse task

To identify the alignment patterns of speech and gesture manifested in discourse schemata in speech and functional gestures, we used direct identification regime. The results presented in Table 3 were processed with Pearson-correlation matrices and reveal the *r*-values (with *p*-values) of discursive effects in speech onto the use of gesture.

As expected, the analysis demonstrated the contingency of discourse schemata distribution on gesture use. These findings enabled us to establish the alignment patterns of speech and gesture by ranging Pearson's *r* and *p*-values from higher (manifesting higher correlation) to lower. The scaled effects are presented below:

Narration and gesture: representational > adaptive > deictic > pragmatic

Description and gesture: representational > adaptive > deictic > pragmatic

Exposition and gesture: representational > adaptive > pragmatic > deictic

Argumentation and gesture: adaptive > representational > pragmatic > deictic

We had predicted that there would be more representational gestures accompanying narrative and descriptive passages. Surprisingly, it also resulted in the most frequent type of gesture in expository passages; however, this could be explained by the fact that expository discourse markers were often embedded in narrative passages. Therefore, there was an ongoing overlap between representational gestures accompanying narration and embedded exposition. Figure 4 illustrates the coincidence of the narrative discourse marker expressed by the action verb *растягиваются / are stretched* and the embedded expository discourse marker expressed by the linker *тем не менее / nevertheless*.

Adaptors were the second most frequent gesture type in narrative, descriptive, and expository passages and the first most frequent one in argumentative passages. Nonetheless, it might be somewhat premature to make far-reaching conclusions about co-speech alignment here as its contingency upon speech functions was dismissed in [Iriskhanova et al., 2023].

Table 3. **Results of the correlation analysis (discourse schemata and gesture)**

Gesture types	Adaptive Pearson's *r* [df; p]	Pragmatic Pearson's *r* [df; p]	Representational Pearson's *r* [df; p]	Deictic Pearson's *r* [df; p]
Discourse schemata Narrative	0.713 [20; <.001]	0.611 [20; 0.003]	0.788 [20; <.001]	0.678 [20; <.001]
Descriptive	0.826 [20; <.001]	0.580 [20; 0.005]	0.889 [20; <.001]	0.736 [20; <.001]
Expository	0.765 [20; <.001]	0.738 [20; <.001]	0.857 [20; <.001]	0.730 [20; <.001]
Argumentative	0.763 [20; <.001]	0.750 [20; <.001]	0.752 [20; <.001]	0.554 [20; 0.007]

Gesture: representational

Speech:
пропорции, **тем не менее**, сохранены, или в **какой-то** момент **растягиваются** [до дома, который находится перед нами] / the proportions are, **nonetheless**, consistent, or **at some point** are **stretched** [up to the house in front of us]

Fig. 4. The use of a representational gesture with narrative and expository discourse markers

Table 4. **Results of the correlation analysis (modifications in speech and AOI)**

Area of Interest	Slides Pearson's *r* [df; p]	Speaker Pearson's *r* [df; p]	Mirror Pearson's *r* [df; p]
Discourse Modification Type			
New versus Old	−0.177 [10; 0.582]	−0.056 [10; 0.864]	0.486 [10; 0.109]
Contrast Focus	−0.284 [10; 0.371]	0.556 [10; 0.060]	0.289 [10; 0.362]
(Un)certainty	−0.369 [10; 0.237]	0.101 [10; 0.755]	0.263 [10; 0.410]
Subject	−0.329 [10; 0.297]	0.248 [10; 0.437]	0.323 [10; 0.306]
Topic as Context	−0.562 [10; 0.057]	0.038 [10; 0.906]	0.595 [10; 0.041]
Perspective	−0.062 [10; 0.848]	0.547 [10; 0.066]	0.217 [10; 0.497]
Omissions	−0.232 [10; 0.468]	0.123 [10; 0.702]	−0.018 [10; 0.956]

Experiment 3. Receptive-productive discourse task

To identify the alignment patterns of perceptual modes, visual and aural, we used indirect identification regime. Visual mode was attested as contingent on a semiotic mode (fixation duration in 3 AOIs) while aural mode was explored via a contingent communicative mode of speech (discourse modifications). The results presented in Table 4 were processed with Pearson-correlation matrices, revealing the *r*-values (as well as *p*-values) of gaze effects in AOIs onto aural mode via a contingent communicative mode of speech.

The results demonstrate low contingency of discourse modification distribution on gaze behaviour. We presume that this is due to the fact that we analyzed contingency indirectly through two modalities at once – semiotic (AOIs) and communicative (speech production), thus it led to low values, which we had predicted. However, the results suggest the crossmodal explanation for the discrepancies in the use of speech and gesture in simultaneous interpreting found in [Cienki, Iriskhanova, 2020]. Nevertheless, scaling the significant or near-significant effects (ignoring the others, given their non-significant p-values) allows to obtain the following:

Visual perception via semiotic mode and Aural perception via discourse modifications in speech:
Slides AOI and modifications: Topic as Context
Speaker AOI and modifications: Contrast Focus
Mirror AOI and modifications: Topic as Context > New versus Old

The results manifest that "Topic as Context" modifications' p-values in AOIs of Powerpoint slides and the Mirror are close to 0.05 (0.057 and 0.041 respectively), Pearson's *r*-values are similar, but one is negative, while the other is positive.

This observation allows to claim that modifications of topical information were seldom used in cases where participants paid close attention to the information presented on the screen, and conversely, were quite frequent during the periods of time when the participants looked at themselves in the mirror. The results suggest that enhanced visually and aurally perceived information leads to significantly lower modifications, whereas the lack of visual perception led to more modifications during the interpreting task.

Considering the results of three studies, we can identify the allowances and constraints of Crossmodal Alignment Framework. Communicative multimodality is subjected to direct observation [Iriskhanova, 2021]; consequently, the alignment patterns can manifest high contingency values (there is an overlap between gestures accompanying different speech patterns), which may mean that significant differences in the use of gestures with speech will be less frequently observed. Semiotic multimodality can be explored in receptive discourse tasks in its perception, which explains the efficiency of the studies determining the participants' gaze behavior in examining image and text semiotic multimodality [Chernigovskaya, Petrova (eds.), 2018; Kiose et al., 2023]; still the contingencies are less frequently observed and can be explained by the differences in perception. Semiotic alignment can also be identified via productive discourse tasks in communicating priorly visually perceived information, for instance in speech [Potekhin, 2023]; in this case contingencies will be expectedly lower being mediated by both perceptual and communicative modes. Perceptual multimodality can be explored as modulated by what people see (visually perceive) and what they relate in speech (audially perceive) – via the participants' gaze behavior

modulated by the areas of interest on the visual stimulus in the semiotic mode and via the participants' productive speech modulated by audially perceived information [Divjak, Milin, Medimorec, 2020]. In this case, the contingencies will be highly mediated by other modes input.

Conclusion

The study advances Crossmodal Alignment Framework which allows to explore the alignment patterns of semiotic, communicative and perceptual modes on common ground – via the discourse tasks, perceptive and productive. Assuming that the use of modes is controlled by cognitive growth points, the study takes this idea further to hypothesize that discourse tasks serve the cognitive growth points to determine the crossmodal alignment.

To attest to it, the study reports the results of three experiments which identify multimodal alignment patterns modulated by different discourse tasks – a receptive task in examining image and text, a productive task in discourse information construal using speech and gesture, and a receptive-productive task in visual and audial information perception and its further transfer in speech. In the study, we determined (1) the patterns of gaze behavior (fixation duration and pupil dilation) modulated by foregrounding in text and image, (2) the patterns of functional gesture modulated by discourse schemata of narration, description, exposition and argumentation, and (3) the patterns of gaze behavior in the stimuli areas of interest and discourse modification in speech of aurally perceived information. Additionally, we scaled the mode effects within each alignment pattern. Alignment of communicative modes (speech and gesture) appeared to manifest strong correlations, while alignment of semiotic modes explored via perceptual mode (gaze) produced lower contingencies and alignment of perceptual modes attested via semiotic and communicative modes displayed the lowest values. Although we found that indirect observation of mode alignment invariably leads to lower contingency effects of the modes, the results prove to be even more significant due to steady character of this contingency.

Overall, the study showed that examining the relations of different modes – semiotic, communicative, perception – is possible via direct and indirect observation. Crossmodal Alignment Framework allows both identifying their alignment patterns and scaling the contribution of each mode. Expectedly, the framework will allow to attest the input of each mode in operating different discourse tasks which is of particular importance in professional discourse and in mediated communication.

NOTE

[1] This research is part of the projects "Multimodal research of the speaker's communicative behavior in different discourse types" (075-03-2020-013) carried out at Moscow State Linguistic University and "Kinesic and vocal aspects of communication: parameters of variance" (FMNE-2022-0015) carried out at the Institute of Linguistics RAS.

[2] The samples taken from repositories served as the research data. The authors of the publication may not share the opinion of the authors of these open access internet samples.

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ASPECTS OF MEDIA MANIPULATION IN COMPLEX COMMUNICATION SITUATIONS [1]

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Abstract. The article examines the forms of manipulation in complex communication situations, the essential component of which is multidirectionality, i.e. individual communicative acts addressing multiple audiences. Since complex communication situations are multidirected, they involve various participants who are direct interlocutors, moderators, communication observers, etc. The paper discusses the phenomena of the communicative action orientation towards multiple audiences in staged communication and the participation of the manipulated audience in Internet communication. Multidirectional communication is typical for advertising and talk shows. Although the speakers in talk shows address their interlocutors directly, their statements are perceived by the audience in the studio and the TV viewers. This situation can have a manipulative effect since the latter are not aware that they are the intended recipients. In commercials, characters explain the benefits of a product to other participants in the staged communication event. However, the communication is aimed at the TV audience, which is involved in a large-scale manipulation. From the point of view of manipulation theory, questions arise, such as the effects of monitoring communication (passive participation), the extent to which the recipient themself is part of the manipulation and the responsibility of the recipient and participant of communication in a communicative event.

Key words: media manipulation, complex communication, manipulation mechanisms, advertising, talk shows, information bubble, responsibility.

АСПЕКТЫ МЕДИАМАНИПУЛИРОВАНИЯ В СЛОЖНЫХ КОММУНИКАТИВНЫХ СИТУАЦИЯХ [1]

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Аннотация. В статье рассматриваются формы манипуляции в комплексных коммуникативных ситуациях, существенной составляющей которых является полиадресованность. Охарактеризованы феномены направленности коммуникативного действия на третьих лиц в инсценированной коммуникации и участие манипулируемого в манипуляции в интернет-коммуникации. Показано, что в полиадресованных комплексных коммуникативных ситуациях участники играют разные роли: непосредственные собеседники, модераторы, наблюдатели коммуникации. Приведены примеры полиадресованной коммуникации в разных жанрах

СМИ. В ток-шоу манипулятивный эффект возникает в силу того, что выступающие обращаются к партнерам по диалогу, но их высказывания воспринимаются зрителями в зале и телезрителями, которые, будучи первыми адресатами высказываний, могут не осознавать этого. В рекламе манипулятивный эффект возникает потому, что персонажи рекламных роликов объясняют преимущества определенного товара другим участникам инсценировки, однако коммуникация направлена на зрителей, при этом адресаты сами принимают участие в масштабной манипуляции. Результаты исследования обусловили необходимость обсуждения в аспекте теории манипуляции следующих вопросов: какие эффекты может иметь наблюдение за коммуникацией (пассивное участие), в какой степени сам реципиент становится частью манипуляции и какую ответственность несет получатель и участник коммуникации в коммуникативном событии.

Ключевые слова: медиаманипуляция, комплексная коммуникация, механизмы манипуляции, реклама, ток-шоу, информационный пузырь, ответственность.

Introduction

The media play a crucial role in the transmission of information and the creation of images, and their impact extends to various aspects of our lives, including politics, economics, culture and social relations. Media manipulation can manifest itself in different ways. The simplest form is distraction through an excess of entertainment. Watching talk shows, films, TV beauty shows, and cooking shows, people are distracted from the pressing problems of their lives, the political and social environment, injustice, inequality, environmental disasters, etc., and thus mentally shut down and remain silent in society and politics, without realizing it. This type of manipulation, mainly called 'bread and circuses', dates back to the Roman Empire, with the media now playing the role of the Roman arenas. The second form of manipulation is a one-sided evaluation of facts or people. It can be either a one-sided positive evaluation of political regimes (especially pronounced in the forms of personality cults) or a one-sided negative evaluation of imaginary enemies, opponents, etc., which finds its most vivid expression in hate speech. The third form of manipulation is disinformation (fake news), which is usually a deliberate lie used to mislead people, force them to misinterpret the facts and make wrong decisions [Karabulatova, 2020].

Furthermore, it is becoming increasingly difficult to distinguish reality from fiction due to the effect of virtual manipulation by artificial intelligence which makes it possible to generate the voices of living or dead people and purport to reproduce documents. The fact that communication in the media is generally multi-addressed further obscures the boundary between reality and fiction, opinion and deception. We refer to this multiple addressing as complex communication. It is explicit in such formats as talk shows, several forms of advertising, comments on the internet, social networks whose debates are public, etc. The article describes the forms of manipulative multiple addressing in complex communication situations and represents a preliminary stage in the development of a typology of complex communication. With the rapid development of digital technologies, in particular the algorithms of social networks and search engines, media manipulation is becoming even more widespread and efficient since the possibilities of integrated communication and mass dissemination of information are increasing significantly. In this regard, it is highly relevant to study the mechanisms of media manipulation in complex communication situations.

Materials and methods

Complex communication situations involve more than two communicative participants who perform different roles, such as, in the first place, direct interlocutors, then moderators, observers of communication, etc. The core of complex communication is its multidirectional nature [Karabulatova, 2020; Kussepova et al., 2023; Zhang et al., 2023]. In complex communication, participants, while addressing each other directly covertly address the wider audience, such as TV viewers or Internet users, who may not be aware that they are the target audience. Similar forms

have long been used in advertising, for example, when characters present products to each other and give advice. The characters engage in verbal exchanges as if they were communicating with each other, but, in fact, in a commercial, the staged communication addresses the target audience. In talk shows, communication is also complex, as there are several vectors of communicative relationships: debaters address each other, debaters address the host of the talk show, and they all address the audience in the studio and, finally, the TV viewers. Comments and public chats on social networks are also complex communication processes where people discuss controversial issues and, at the same time, find themselves under the scrutiny of a large audience. These seemingly open formats can give rise to so-called "information bubbles" or "filter bubbles" in which the same opinions circulate.

Our article presents a theoretical and systematic description of certain types of complex communication situations in the media. We have studied English and German publications in the field of media and communication that analyzed various aspects of media manipulation and its relation to complex communication [Bondi Paganelli, 1990; Petter-Zimmer, 1990; Kühn, 1995; Burger, Luginbühl, 2014, pp. 1-37]. From the point of view of manipulation theory, questions arise such as, for example, what effects the monitoring of communication can have, to what extent seemingly passive recipients are part of the manipulation and what responsibility they bear for the outcome of a communicative event.

Discussion

Inherent in the media, manipulation and its various forms of manifestation have received considerable attention in contemporary research. These entirely different forms of manipulation often have a common ground in their criticism. The media almost always seem to serve as autonomous active intermediaries for an audience that is primarily powerless to resist manipulation and which, of several alternative presuppositions, through manipulative tricks and techniques, involuntarily chooses the one that benefits the manipulator [Kusse, Shakenova, 2024; Shakenova et al., 2020]. Expanding on the well-known concept of media "The Medium is the message"

proposed by McLuhan [McLuhan, 1967], the criticism of manipulation emphasizes that media technology (print, radio, television, Internet, etc.) determines not only the forms and contents of the transmitted messages but also their impact on the recipients. In 1988, German media philosopher Sybille Krämer wrote: "Media not only transmit messages, but have an impact that shapes the way we think, perceive, remember and communicate. <...> Media conveys the idea that our attitude to the world and, consequently, all our activities and experiences are cognizant of the world… The function is characterized by the possibilities of differentiation that media opens up and the limitations they impose" [Krämer, 1998, p. 14] (Hereinafter, the translation of quotations and examples from German or Russian into English was made by the authors of the article, unless otherwise indicated). In the first decade of the 21st century, the cultural critic Ludwig Jaeger called the media "operators that simultaneously constitute the content they store, generalize or distribute" [Jäger, 2004, p. 14] and, thereby, determine the "mentality" of their recipients. It is no coincidence that Jaeger sees here a parallel with Wilhelm von Humboldt's philosophy of language, according to which language is "the formative organ of thought" [Jäger, 2004, p. 15]. Since language itself is a medium, we can extend the manipulation theory by saying that media form thoughts and, therefore, are manipulative.

In discussions about the manipulative effects of media, however, it is not always clear who is manipulating: the media as an anonymous force that controls people, like the force of nature, or media makers, that is, people who use media as a tool of manipulation. This situation is very similar to discussions about the principle of relativity of language: does language influence the way people think, or is it speakers who influence thought (their own and of others) through their speech?

It is impossible to ignore the fact that communication is not one-way. The communication model that includes only three elements such as the sender, the medium, and the receiver, is too simple and, at its best, is suitable only for crude propaganda or brainwashing methods in which the receiver is only a passive object of manipulation. However, in real life, the recipient is usually part of the message since communication is a joint activity of communication partners. This situation is evident in

face-to-face communication, but even in such seemingly one-sided media as television, where the recipients remain mostly passive, they can actively participate in communication thanks to the ability to turn broadcasts on and off. In new media, everyone can play an active role. In social networks, there is not one sender and many recipients, as the term *media* suggests, but a set of participants, whose number is practically unlimited. The number of third parties who can monitor this communication is also unlimited, for example, when an Internet user reads comments and discussions on social media.

Therefore, when discussing media manipulation, first of all, it is necessary to determine what communication situations we are dealing with, who is manipulating, who is the object of manipulation, and whether media users themselves are involved in the manipulation, or are merely passive recipients of manipulative acts. In this article, we will consider two forms of manipulation in complex communication situations: the orientation of the communicative action towards third parties in staged communication, and the participation of the manipulated in manipulation. It is possible to distinguish different aspects of the study of manipulation in complex communication: psychological, social, political, cultural, linguistic, rhetorical and stylistic, and others.

Now, the issues of automatic text recognition and processing are getting more and more. Methods for the automatic detection of text sentiment, intonation patterns, and speaker register changes are widely used for various applications. Thus, the automatic detection of manipulation in communication situations is becoming an increasingly important goal, including manipulation detection in social networks and online platforms. However, this paper takes a pragmalinguistic perspective on media manipulation in complex communication.

Results

Complex communication is multidirectional because it addresses different audiences. In complex communication situations, we distinguish two types of manipulation: those that focus on third parties in staged communication and those that focus on the participation of the manipulated.

The phenomenon of staged communication involves situations in which one side of the communication uses third parties (for example,

deliberately mentioning a person or group of people) to achieve its goals (to create an impression or influence the opinion of the interlocutor, to discredit or promote an image of someone or something). As a result of the participation in manipulation, the manipulated person tends to make certain decisions or act according to the manipulator's wishes without realizing that he or she involved in the manipulation. Persuasion is achieved through manipulative rhetorical techniques that play on emotions and may cause emotional distress.

1. The focus of the communicative action on third parties

Complex communication situations that involve multiple addressees (multiple addressability) occur not only in modern media but also involve everyday interactions. As we analyzed individual examples of this communicative phenomenon, we did not set the task of providing quantitative data using statistical research methods. Manipulation is a characteristic feature of conflict communication situations. In the following excerpt from the novel *The Unbearable Lightness of Being* by Milan Kundera, Marie-Claude, the wife of one of the characters, Franz, insults his girlfriend, Sabine. However, the insult is primarily intended to have an effect on the guests in the house. The statement is manipulative because its content does not matter to the speaker, because it is insincere and serves only to demonstrate power relations:

(1) At that point, Sabina entered the room. Marie-Claude walked up to her. After a few friendly words of greeting, Marie-Claude lifted the ceramic pendant from Sabina's neck and said in a very loud voice, What is that? How ugly! <...>

I made it myself, said Sabina. <...>

Franz suddenly saw the answer plainly: Marie-Claude proclaimed Sabina's pendant ugly because she could afford to do so.

Or to be more precise: Marie-Claude proclaimed Sabina's pendant ugly to make it clear that she could afford to tell Sabina her pendant was ugly. <...> Marie-Claude had taken advantage of the occasion to make clear to Sabina (and others) what the real balance of power was between the two of them (Kundera, 1984).

In a talk show, a dispute is a popular form of manipulation in complex communication. We did not

analyze the statistics of these disputes but focused on individual talk shows in which participants are involved in specially created situations or are assigned certain roles to achieve communicative goals, including managing public opinion or creating an image. These forms of manipulation in complex communication situations are used to influence the audience's opinion, form ideas or shape behavior. In a talk show, for instance, one interlocutor can insult another and demonstrate his strength in front of the audience, as Marie-Claude does in the excerpt described above. A well-known case on Russian television took place more than a decade ago and involved the right-wing extremist politician Vladimir Zhirinovsky (1946–2022) who was notorious for his rudeness and used to insult not only his political opponents but also representatives of other social groups. In February 2012, on the talk show *Duel*, one of his opponents was the famous Russian pop singer Alla Pugacheva. She directly addressed the politician and listed several possible reasons for his behavior:

(2) Вы, когда хамите... ну, ладно мне, бог с вами – я к этому уже привыкла от вас – вы что хотите доказать? Когда вы врете, нагло, в эфире, в этой программе, зачем? Когда вы ведете себя настолько неприлично даже для кандидата в президенты. <...> Мой вопрос: Это часть имиджа, разрешенного вам сверху? <...> Это пробелы в воспитании вашем? Или, не дай бог, это что-то такое, с неврозом связанное. Если бы вы стали президентом, поменяли бы свою линию поведения? Потому что это все-таки на весь мир (Zhirinovsky VS Prokhorov..., 00:00:36–00:01:35).

You, when you are rude... well, okay me, God be with you – I'm already used to it from you – what do you want to prove? When you lie, blatantly, on the air, in this program, why? When you behave so indecently, even for a presidential candidate. <...> My question is: Is this part of the image allowed to you from above? <...> Are these gaps in your upbringing? Or, God forbid, it's something related to neurosis. If you became president, would you change your line of behavior? Because it's all over the world after all [2].

In his reaction, Zhirinovsky rejected all the possible reasons for his actions and insulted his opponent again.

(3) Все? Отвечаю. Я веду себя так, как я считаю нужным. Мне имэджмайкеры не нужны. <...> Я такой, какой я есть. Я это уже сказал. В этом моя прелесть... Вы, артисты, как последние проститут-ки ложитесь под любого руководителя за деньги. (Zhirinovsky VS Prokhorov..., 00:01:39–00:03:25).

Have you finished? I will answer. I behave as I see fit. I don't need image makers. <...> I am who I am. I've already said that. This is my charm... You artists, like the last prostitutes, lie down under any leader for money.

Alla Pugacheva, in turn, called Zhirinovsky a "clown and a psycho" (00:02:41–00:02:42). On the one hand, it is an argument between the two opponents who attack each other in the discussion. However, more important than the personal confrontation was the effect on the audience in the studio, who demonstrated their participation in the debate with applause and shouts, and on the audience of TV viewers, who expressed themselves mainly in comments on the Internet. In this public exhibition match, both interlocutors sought to belittle each other, although they used different tactics. Zhirinovsky used explicit insults, and Pugacheva used questions to provoke her opponent into behavior that would disqualify him in front of the audience. The talk show host directly expressed the potential communicative effect:

(4) Вы меня извините, но то, что вы делаете. <...> Вы себя публично хороните (Zhirinovsky VS Prokhorov..., 00:03:53–00:03:58).

I'm sorry, but what are you doing? <...> You are burying yourself in public.

In these debates, which were part of the 2012 presidential campaign, there was no discussion of political content. A personal clash served only to belittle the opponent in front of the audience. However, the effect of such clashes cannot be completely controlled by the speakers. The online newspaper NEWSru.com commented:

(5) Стоит отметить, что реакция зрителей на скандал достаточно разнообразна, и, если одни отмечают, что поведение Жириновского недостойно, другие заявляют, что он выдал «правду-матку» (Zhirinovsky Insulted Pugacheva...).

It is worth noting that the reaction of viewers to the scandal is quite diverse, and while some note that Zhirinovsky's behavior is unworthy, others say that he gave out the "truth of the matter".

In complex communication, one of the widely used techniques is the manipulation through emotions, namely empathy, hope, anger, and fear, etc. They are used to elicit certain reactions from the audience, they modify their behavior or form

their opinions. On the dialog platform of the talk show *There is a way out* of the Seventh Channel of Kazakh television, a discussion was held on the popular, even, one might say, widely discussed topic of polygamy among Kazakhstanis. The presentation of the topic "Polygamy in Kazakhstan is a relic of the past or a solution to modern problems" deliberately prepared the audience for a discussion in which there will probably be those who are "for" or "against". One of the heroes of the program, Kenishbek Satov, the husband of four wives in real life, who speaks in favor of polygamy in the studio, knowing that officially polygamy is not allowed in Kazakhstan, describes this phenomenon from the positive side, actively using words with a positive stance:

(6) Вы когда говорите слово «жена», я всегда думаю, что это женщины. У меня четыре женщины... Это все началось от **любви** к женщинам. Я **люблю** женщин. Мой папа **любил** женщин. В советское время, когда все это было запрещено и было преступно, он тоже был полигамным. У меня было три **мамы**. Я видел **ласки** три. Поэтому я был **обласканный** ребенок. <...> Я слово «жена» не понимаю, это женщина **любимая**, второе, я понимаю, это **друг,** с которым я **советуюсь**. И у нас идет акцент на **детей**. <...> Во-первых, они должны знать **уважать** мужчину, знать, кто такой мужчина. Я свои обязанности знаю. Знает ли она свои обязанности быть женой, быть в **семье**, быть в **коллективе**, быть **мамой**... Если человек **счастливый**, рядом люди будут **счастливыми** (There Is a Way..., 00:01:50–00:08:18).

When you pronounce the word "wife", I always think that these are women. I have four women... It all started from the love of women. I love women. My dad loved women. In Soviet times, when all this was forbidden and it was criminal, he was also polygamous. I had three moms. I saw the caresses of three. That's why I was a petted child. <...> I do not understand the word "wife", this is a beloved woman, the second, I understand, is a friend with whom I consult. And we are focusing on children. <...> First, they should know to respect a man, to know who a man is. I know my responsibilities. Does she know her responsibilities to be a wife, to be in a family, to be in a team, to be a mom... If a person is happy, people will be happy next to him.

During his speech, this participant often used jokes and played with the TV presenter, thus endearing the audience and gaining supporters. For example:

(7) – Расскажите, пожалуйста, сколько у Вас сегодня жен?

– Хороший вопрос. Вы только что сам сказали, что один лучше два. Вы сами же ответили на этот вопрос, который мне задали. Один лучше, чем два.

– У Вас, насколько мне известно, не одна и не две?

– Да, у нас как получается, если любишь, то тогда увеличивается везде.

– Так сколько же? Мы так и не услышим конкретную цифру.

– Конкретную цифру Вам надо.

– Ну конечно же. <...>

– Давайте я так буду так угадывать. Три?

– Да. Вы говорите. Я всегда буду говорить да.

– Четыре?

– Да.

– Пять?

– Нет.

– Четыре?

– Да.

– Четыре жены (аплодисменты) (There Is a Way..., 00:01:05-00:01:38).

– Tell me, please, how many wives do you have today? – That's a good question. You just said yourself that one is better than two. You yourself answered this question that was asked to me. One is better than two. – As far as I know, you don't have one or two? – Yes, as it turns out, if you love, then it increases everywhere. – So how much? we didn't hear a specific number. – You need a specific number. – Of course. <...> – Let me guess this way. Three? – Yes. You speak. I will always say yes. – Four? – Yes. – Five? – No. – Four? – Yes. – Four wives (applause).

In this example, as we can see, the game was based on a question-and-answer uni with the yes-no answer. To the question "What are your responsibilities?", the hero of the show answered as follows, continuing to use words with a positive emotional connotation, but jokingly evading discussion of the issue of financial responsibility, emphasizing that modern women are independent and emancipated:

(8) **Поддерживать** эту женщину, **ласкать** эту женщину, **любить** эту женщину. А кормить и одевать это какое-то знаете я не знаю сейчас женщин не надо кормить? Они сами на машине ко мне подъезжают, в шубе... (There Is a Way..., 00:06:58–00:07:15).

To support this woman, to caress this woman, to love this woman. And feeding and dressing is some kind of you know, I do not know, nowadays women don't need to be fed or? They drive up to me in a car, in a fur coat...

At the same time, the opposite opinion against polygamous marriages represented by the well-known Kazakhstan TV presenter and actor Nurtas Adambayev did not sound categorical:

(9) На самом деле, слушая Кенишбека, я понимаю, что если ему это удобно, если его жены с этим согласны, то почему бы и нет. Но это скорее какое-то исключение, частный случай... Что кривить душой, для многих мужчин многоженство – это какое-то счастье, ну, потому что есть разнообразие, есть выбор. Но как бы мечты мечтами, но есть реалии. Есть реалии. Но, к сожалению, уровень в нашей стране не такой высокий, так чтобы мужчина мог обеспечивать несколько жен (There Is a Way..., 00:12:35–00:13:37).

In fact, listening to Kenishbek, I realize that if it is convenient for him, if his wives agree with it, then why not. But this is rather an exception, a private case... For many men, polygamy is a kind of happiness, because there is variety, there is a choice. But dreams are dreams, but there are realities. There are realities. But, unfortunately, the level in our country is not so high that a man can provide for several wives.

The opinion of another guest called Iskander, speaking against polygamy, also sounded uncategorical and unconvincing:

(10) Я абсолютно не осуждаю Кенишбека. <...> Но я и не против. <...> Это связано с тем, что тогда мужчины часто воевали, был большой дисбаланс между мужчинами и женщинами. И женщины, если бы не многоженство, умерли бы от голода и нищеты. Но сейчас-то, слава богу, уже какое поколение. Моя бабушка была четвертой женой. <...> Это пережиток прошлого (There Is a Way..., 00:18:27–00:18:57).

I absolutely do not condemn Kenishbek. <...> But I don't mind either. <...> This is because at that time men often fought, there was a big imbalance between men and women. And women, if there was no polygamy, would have died of hunger and poverty. But now, thank God, what a generation. My grandmother was the fourth wife. <...> It's a relic of the past.

The participants in the talk show are not only talking to each other and expressing their opinions, but they are also trying to persuade in their opinion both their direct interlocutors and the general public. In this example, this is partly done by rational argumentation and partly through the emotional appeal of speech.

An attempt to influence third parties in complex communication can also be observed in economic discourse, especially advertising. In any advertisement, regardless of the target audience – Russian, Kazakh, American, etc., various strategies can be used to manipulate the audience, including creating the illusion of the need for a product or service, distorting facts or attracting famous personalities to promote the product, as well as creating a fictional, but seemingly realistic game scene with actors or fake persons, i.e. staging complex communication.

Staged communication has become a traditional form of advertising since the advent of radio and television. The Austrian Slavist Edgar Hoffmann calls it "secondary advertising communication" [Hoffmann, 1997]. This type of advertising communication is secondary since the main appeal to the recipients of the commercial encouraging them to buy is replaced by communication between the characters in a fictional, but seemingly realistic scene. As a prototype, Hoffmann cites a toothpaste commercial shown on Russian television in the 1990s. A mother takes her daughter to the dentist, who diagnoses a cavity. The following dialog takes place:

(11) Мать: Всего одна дырочка, ничего страшного.
Стоматолог: Всего? Это же кариес. Одна в год, а сколько их будет, когда девочка вырастет? Тем более, что кариес может привести к потере зуба.
Дочь: Но мы же регулярно чистим зубы!?
Стоматолог: Не все пасты одинаковые. Я рекомендую Блендамед с его фтористой системой Флуристат, а лучшей защиты от кариеса не существует [Hoffmann, 1999, pp. 71-72].

Mother: Just one hole, it's nothing. Dentist: Just one? It's a cavity. One in a year, and how many will there be when the girl grows up? Moreover, caries can lead to tooth loss. Daughter: But we brush our teeth regularly!? Dentist: Not all toothpastes are the same. I recommend Blendamed with its Fluoristat fluoride system, and there is no better protection against tooth decay.

In the next scene, which takes place later, the dental decay is predictably no longer detected because the mother and daughter used the recommended toothpaste. The dentist's statement that the teeth are now healthy is immediately followed by a voice-over, which confirms the advertised brand of toothpaste, which dentists supposedly recommend.

(12) Дочь: У меня ни одной новой дырки.

Стоматолог: Теперь у нас здоровые зубы.

Голос за кадром: Блендамед. Стоматологи свидетельствуют: Лучшей защиты от кариеса не существует [Hoffmann, 1999, pp. 72].

Daughter: I don't have a single new hole. Dentist: Now we have healthy teeth. Voice-over: Blendamed. Dentists testify that there is no better protection against tooth decay.

This kind of commercial has long been on television and the Internet, and the recipients are fully aware that it is staged for advertising purposes and that all the participants are actors, i.e. the alleged dentist is not a dentist in real life. However, this form can be characterized as a certain type of manipulation or an attempt at manipulation. Hoffmann argues that secondary advertising communication reduces the ability of recipients to decode the sender's real intention [Hoffmann, 1999, p. 71].

FoodMaster's advertisement promoting the brand of curdled milk "BIO-C Imun+" is an example of complex staged communication in Kazakh media. The video begins with a conversation between two friends, which we understand to be actresses playing the role of friends:

(13) – Как провели выходные?

– Как обычно, сын приболел. А вы?

– А мы... Начали с БИО-С. Веселилились. Гуляли. Удивлялись. То есть как всегда. Попробуйте (Bio-C..., 00:00:01–00:00:14).

– How did you spend your weekend? – As usual, my son is ill. And you? – And we... started with BIO-C. We were having fun. We walked. They were surprised. That is, as always. Try.

After the dialog, a voice-over notes the advantages of this product in the form of the advertising slogan *BIO-C Imun+ – double immunity protection for a bright life for your family*. The commercial ends with a friendly appeal from one of the characters to all consumers: *How did you spend your weekend?* This question reflects the sender's intention – a call to live brightly, which is impossible without the strong immunity provided by the advertised product. In this case, the appeal to the audience is not covert but explicit, and the manipulative trick is that the speaker is staged as an advisor and friend of the audience and, thus, plays the role of a close person whom the recipient can trust completely.

The intended recipients believe they are simply witnessing a recommendation that turns out to be correct. Formally, therefore, it is a manipulative disguise of the intended addressee. In traditional toothpaste advertisements like the one quoted, this is, undoubtedly, a very mild form of manipulation, but we can observe more serious cases of media manipulation in secondary communication. Consider, for example, the staging of interviews with alleged experts on economic or military issues in order influence the opinions of people who are not directly addressed, but are pushed into the role of witnesses to seemingly reasonable considerations and beliefs.

2. Involvement of the manipulated in the manipulation

The methodology for identifying manipulated groups can include data analysis, collecting information about the target audience, using sociological research methods, as well as analyzing content and communication aimed at a particular group (for example, analyzing social networks, online forums, surveys and interviewing focus groups, etc.), machine learning and data analysis to characterize manipulated groups based on training data, including marked-up examples of groups subject to manipulation. However, as noted above, we are interested in the pragmatic side of manipulation and the role of participants in complex communication. It is important to note that targets of media manipulation are not necessarily passive groups if we consider communication participants from the perspective of their activity and passivity. They can actively participate in manipulation by themselves. An impressive literary example illustrating this type of manipulation is the beginning of the famous dystopian novel *We* by Yevgeny Zamyatin written in 1920. The novel, which is set in the future begins with a quote from the *State newspaper*, which publishes an appeal to society to take part in the glorification of the *United State* by submitting creative pieces of writing about their absolute happiness reduced to formulas and equations to be carried by the spaceship *Integral* built to invade and conquer extraterrestrial planets:

(14) Через 120 дней заканчивается постройка ИНТЕГРАЛА. Близок великий, исторический час, когда первый ИНТЕГРАЛ взовьется в мировое пространство. Тысячу лет тому назад ваши героические предки покорили власти Единого Государства весь земной шар. Вам предстоит еще более славный подвиг: стеклянным, электрическим, огнедышащим ИНТЕГРАЛОМ проинтегрировать бесконечное уравнение вселенной. Вам предстоит благодетельному игу разума подчинить неведомые существа, обитающие на иных планетах, – быть может, еще в диком состоянии свободы. Если они не поймут, что мы несем им математически-безошибочное счастье, – наш долг заставить их быть счастливыми. Но прежде оружия – мы испытываем слово.

От имени Благодетеля объявляется всем нумерам Единого Государства:

Всякий, кто чувствует себя в силах, обязан составлять трактаты, поэмы, манифеста, оды или иные сочинения о красоте и величии Единого Государства. Это будет первый груз, который понесет ИНТЕГРАЛ.

Да здравствует Единое Государство, да здравствуют нумера, да здравствует Благодетель! (Zamyatin, 1991).

In another hundred and twenty days the building of the *Integral* will be completed. The great historic hour is near, when the first *Integral* will rise into the limitless space of the universe. One thousand years ago your heroic ancestors subjected the whole earth to the power of the United State. A still more glorious task is before you: the integration of the indefinite equation of the COSMOS by the use of the glass, electric, fire-breathing *Integral*. Your mission is to subjugate to the grateful yoke of reason the unknown beings who live on other planets, and who are perhaps still in the primitive state of freedom. If they will not understand that we are bringing them a mathematically faultless happiness, our duty will be to force them to be happy. But before we take up arms, we shall try the power of words.

In the name of the Well-Doer, the following is announced herewith to all Numbers of the United State: "Whoever feels capable must consider it his duty to write treatises, poems, manifestoes, odes, and·other compositions on the greatness and the beauty of the United State.

This will be the first cargo which the *Integral* will carry. "Long live the United State! Long live the Numbers!! Long live the Well-Doer!!!" (Zamiatin, 1924).

In the novel, the *United State* is a giant manipulation machine that suppresses personality, free will, creativity and love, ultimately all human values, and reduces people to the level of machines. Thus, this is the maximum degree of manipulation. All those who have hitherto lived outside the world dominated by totalitarianism must now accept it. The means to achieve this acceptance are both military force and propaganda: "But before we take up arms, we shall try the power of words." The readers of the *State newspaper* are no longer people, but only numbers, but now they are called upon to actively participate in the propaganda of their instrument of oppression in poems, treatises, etc. In this way, they themselves become manipulators and actively strengthen the effect of manipulation to which they are subjected.

Today, due to the ease of sharing and spreading disinformation, conspiracy theories, and state and non-state propaganda, manipulation has become deeply ingrained in modern society. As a result, people who create information bubbles often find themselves trapped in them. The information bubble looks like an ecosystem of familiar and user-friendly applications, selected platforms and information sources, websites, and pages on social networks. However, social media provides a way to express disagreement. In this way, it is quite easy to identify information bubbles designed to manipulate information as they do not contain contradictions or disagreements. A good example of this is the comments on the public dispute between Vladimir Zhirinovsky and Alla Pugacheva, which was already discussed above. After this public clash, the comments for and against Zhirinovsky and for and against Alla Pugacheva were very different. YouTube viewers can still watch the dispute, which is still attracting attention today, as new comments are being posted all the time. Now, the comments always take a negative stance against Pugacheva and in favor of Zhirinovsky:

(15) @user-qn4tq1yp5j – Жириновский был во всём прав каждое слово

@michaelshell8897 – «У нее закон один – менять мужей каждые пять минут!» Молодец, Владимир Вольфович, всё по делу сказал!

@user-pt6ip1jg9v – 2023 год, время всё расставило по своим местам. Где сейчас Жириновский, вечная память выдающемуся политику, и куда уехали другие патриоты из этой программы...

@user-fy9kl1vx4t – Где сейчас Прохоров? Я о нем ничего не слышала после этих выборов. Пугачёва понятно где и с кем. Вечная память великому политику В.В. Жириновскому!

@Kat_kosti – Пугачева еще тогда показала свое лицо!!!! Жириновскому вечная память!!! Светлая память!!!

@user-sc8sd9cy3t62bn – Поклон и Слава Владимиру Вольфовичу!!! Помним, любим, не забудим никогда!!! Хороший отпор дал Пугачихе, что бы не забывалась и знала свое место – только на сцене!!! Молодец!!!

@nizaketbabaeva6471 – Теперь все поняли кто гордость а кто позор народа!

@user-ne6pp3xi6b – Да , как прав был Жириновский!!! время показало кто есть кто!!

@user-zb6hp3dr5z – Время показало, кто «позор страны», которая предала народ и сбежала в такое непростое для страны время, а кого оплакивал народ и до сих пор смотрит все его видео в интернете. Светлая память.

@user-qn4tq1yp5j – Zhirinovsky was right about everything, every word. @michaelshell8897 – "She has one law – to change husbands every five minutes!" Well done, Vladimir Volfovich, he said everything to the point! @user-pt6ip1jg9v – 2023, time has put everything in its place. Where is Zhirinovsky now, eternal memory of an outstanding politician, and where have other patriots from this program gone... @user-fy9kl1vx4t – Where is Prokhorov now? I haven't heard from him since this election. Pugachev is clear where and with whom. Eternal memory to the great politician V.V. Zhirinovsky! @Kat_kosti – Pugacheva showed her face back then!!!! Eternal memory to Zhirinovsky!!! Bright memory!!! @user-sc8sd9cy3t62bn – Bow and Glory to Vladimir Volfovich!!! We remember, we love, we will never forget!!! He gave a good rebuff to Pugachikha, so that she would not forget and know her place – only on stage !!! Well done!!! @nizaketbabaeva6471 – Now everyone understands who is the pride and who is the shame of the people! @user-ne6pp3xi6b – Yes, how right Zhirinovsky was!!! Time has shown who is who!! @user-zb6hp3dr5z – Time has shown who is the "shame of the country", who betrayed the people and fled at such a difficult time for the country, and who was mourned by the people and still watches all his videos on the Internet. Bright memory.

Even the few examples where there are no longer opposing opinions show that the comments serve the purpose of propaganda. The created opinion bubble is reminiscent of the novel *We* by Zamaytin. Today, it is not entirely clear whether many people sing along with this choir or whether these are artificially generated texts. However, the one-sidedness of the commentary allows any user to understand that this is not an opinion, but a large-scale attempt at manipulation.

3. *Manipulation and responsibility*

Undoubtedly, an important issue to date is the reliability of information in the media and the responsibility for its credibility. The assessment of reliability depends on many factors, including independence, professionalism, ethics, access to resources and technology, and the political and economic interests of the audience. We live in a digital age where information is constantly updated, and therefore the possibilities for manipulating opinions and shaping behavior are constantly expanding through traditional and new social media. This situation can reinforce the view that media users are largely passive objects of manipulation. Media users cannot always accurately determine whether comments and other texts on the Internet come from real people or are artificially generated, and whether complex communication for manipulative purposes is staged or still genuine and sincere. However, manipulation should not exempt media users of their responsibility and they can ask themselves self-critical questions to protect themselves against manipulation, namely:

To whom is the communication directed?

What effect do I create by participating in certain public formats on social networks? Where do I increase my attempts at manipulation?

When I recognize information bubbles by their one-sidedness, do I want to refuse to participate in the communication, or do I feel comfortable in a bubble, even when I know its content is lies? Why does this happen, and how can I avoid participating in destructive communication?

Conclusion

In the modern information age, media manipulation is crucial in shaping public opinion. However, the term 'manipulation' is often used in a limited way to refer only to one-sided forms of influence. The sender uses fake news, one-sided information, false evaluations of people and facts, including the use of euphemisms or dysphemisms, personality cults, or hate speech to overvalue the self or devalue others, etc., in order to influence the audience. In this simple model of communication, the recipients appear passive. They are only the object of manipulation, not participants in the communication. In reality,

however, communication is usually complex, i.e., it is multi-addressed and can have multiple senders simultaneously. Typical media formats are talk shows and commercials with staged communication, but also communication in social networks, the use of comment functions on the Internet, etc. In our opinion, complex communication should receive more attention in the future when it comes to questions of media manipulation. Therefore, in this article we have focused specifically on media manipulation in complex communication situations.

In complex communication, the sender and receiver cannot always be clearly identified, because they can change all the time. When talk show guests talk to each other, the actual recipients of the communication are often viewers who are not directly involved in the discussion. The same is true of commercials, where actors communicate with each other, but the advertising message is directed at the audience. Media literacy therefore includes the ability to correctly identify the addressee and to see through possible indirect attempts at manipulation. However, media users are also directly involved in media communication when they express themselves in social networks, refer to each other in comment functions, and so on. Since this communication is public, it is also a complex communication. Media users communicate with each other, but their messages are also addressed to recipients who read them without directly participating in the communication. This means that there is intentional or unintentional multiple addressing. Information bubbles that arise during these processes of complex communication make the audience more vulnerable to manipulation. To make matters worse, forms of communication on social networks or in Internet comments can now be artificially generated (bots). This makes it necessary to consume media with great vigilance and to participate in media communication very responsibly.

The fact of mass manipulation increases the responsibility of the recipient in the media world. In this regard, it is essential to develop media literacy and critical thinking to help media recipients distinguish and analyze information, recognize the mechanisms of manipulation, especially in complex media communication, and understand their own responsibility as well as seemingly passive recipients, and as active participants when using social networks, commentaries and other forms of media communication. Responsibility can be trained through self-critical questions such as "What effect do I create by participating in some certain public formats on social networks?"

NOTE

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[2] Here and below the translation is ours, unless otherwise stated.

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UNDERSTANDING EMOTIONAL RESPONSES TO TEXT:
A PSYCHOLINGUISTIC INVESTIGATION OF VISUAL INFLUENCES [1]

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Abstract. The paper explores the influence of visual elements on the emotional perception of textual content. Based on the experimental results, the authors evaluated how illustrations affected emotional responses to polycode/creolized texts. By using the semantic differential scales method, correlations between emotions and specific visual parameters were identified and analyzed. The results revealed how visual parameters of illustrations influence emotional responses to text in Russian, suggesting potential adjustments to emotional perception by manipulating these parameters: illustration style impacts recipient emotions; ambiguity and originality increase negative emotions, while realistic illustrations have varied effects. Additionally, the study investigated how variations in illustration style and content altered emotional interpretations of text, providing insights into the complex interplay between visual and verbal elements in communication. The findings suggest practical implications for educational material development, emphasizing the potential to adjust the emotional perception of textual content by manipulating visual characteristics. This research sheds light on the dynamics of emotional response to multimedia stimuli and offers valuable considerations for content creators seeking to optimize audience engagement and comprehension. It attempts to bridge the gap between visual perception, emotion processing, and linguistic communication, offering insights for both practical applications in NLP (Natural Language Processing) and theoretical advancements in cognitive sciences.

Key words: polycode texts, creolization, emotion, emotional perception, verbal message, semantic differential scales method, text-image interaction.

ВОСПРИЯТИЕ ЭМОЦИОНАЛЬНОСТИ ТЕКСТА:
ПСИХОЛИНГВИСТИЧЕСКОЕ ИССЛЕДОВАНИЕ ВЛИЯНИЯ ВИЗУАЛЬНЫХ ПАРАМЕТРОВ [1]

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Аннотация. Исследуется влияние визуальных элементов на эмоциональное восприятие текста. На основании результатов серии экспериментов авторы проанализировали воздействие иллюстраций на эмоциональные

реакции при восприятии поликодовых / креолизованных текстов. С помощью метода семантического дифференциала были выявлены и изучены корреляции между эмоциями и параметрами изображений. Было описано влияние визуальных характеристик иллюстраций на эмоциональную реакцию респондентов на русскоязычные тексты, что предполагает возможность корректировки эмоционального восприятия через манипуляцию этими параметрами: стиль иллюстраций оказывает влияние на эмоции реципиентов; неоднозначность и оригинальность иллюстрации усиливают негативные эмоции, тогда как реалистичные изображения вызывают более разнообразные эмоциональные реакции. Показано, как изменения стиля и содержания иллюстраций меняют эмоциональные интерпретации текста, отражая сложное взаимодействие визуальных и вербальных элементов в коммуникации. Полученные данные могут быть использованы для разработки обучающих материалов, поскольку демонстрируют ресурс регулирования эмоционального восприятия текстов посредством визуальных элементов. В исследовании сделана попытка определить динамику эмоциональных реакций на мультимедийные стимулы, что будет полезно разработчикам медийного контента. Предложено решение задачи преодоления разрыва между визуальным восприятием, эмоциональной обработкой и языковой коммуникацией, которое имеет теоретическое и прикладное значение для обработки естественного языка (NLP) и в когнитивных науках.

Ключевые слова: поликодовый текст, креолизация, эмоция, эмоциональное восприятие, вербальное сообщение, метод семантическогшо дифференциала, взаимодействие текста и изображения.

Introduction

Polycode texts are used in various forms of communication, particularly intensively in advertising and educational practices. It is commonly believed that adding color to educational literature helps avoid monotony and boredom. Illustrating texts, aside from its inherent decorative and "entertaining" function, also enhances the perception of verbal material by employing dual coding of information – both verbal and visual. The assertion that emotions rule the world has become commonplace in the 21st century. Everyone knows that if you cannot change the situation, you can change your attitude towards it. The ability to control one's emotions is of great interest to many, and is often utilized by organizers of various courses and coaching programs, offering their products. However, there is another side to this issue – the ability to control the emotions of recipients through the creation of messages with specific parameters. The potential for manipulating public opinion is well-known to all. However, few understand exactly how this happens. One of the most covert methods of manipulation is the creolization of verbal text – its illustration. Readers, when introduced to verbal text, perceive illustrations uncritically, unaware that the image can alter the perception of the verbal text. This assertion is based on the interpretation of the results of several series of experiments,

during which a change in the perception of verbal text under the influence of illustration was observed [Vashunina, 2007; Kreolizovannyy tekst..., 2020]. Thus, the purpose of this paper is to describe the influence of illustrations on the perception of verbal text and to explore how specific visual parameters affect emotional responses to textual content.

Theoretical framework

This study is grounded in the linguistic theory of emotions and the theory of perception of creolized text. The essence of the linguistic theory of emotions, developed by V.I. Shakhovsky, can be summarized as follows: humans reflect the world passionately and selectively, relying on their emotional states. Emotions also act as intermediaries between the objective world and its reflection in language, capturing the emotional significance of objects for humans. Emotional experiences expressed in words and statements are understood by all speakers of a specific language. This is because emotions are "sociologized and psychologized" [Shakhovsky, 2008, p. 5] within the linguistic community, serving not only as a tool for evaluating the surrounding environment but also constituting a significant component of this environment and the worldview. In this context, emotiveness, as a linguistic category, is an integral property of language for expressing psychological

(emotional) states and experiences of individuals through specific linguistic units and speech constructs – *emotives*. Emotives are further classified based on the extent of reflected emotions in their semantics, the modus of emotiveness, the type of emotive semantics, and the parameter of explicit or implicit expression.

At present, emotiology is being developed within a number of theoretical approaches in Russia (see: [Babenko, 2022; Zhelvis, 2001; Ionova, 2022; Krasavskiy, 2008; Lukyanova, 2015; Shakhovsky, 2010; etc.]) and internationally (see: [Absattar, Mambetova, Zhubay, 2022; Chentsova-Dutton, 2020; Jackson et al., 2019; Lindquist, 2021; Ponsonnet, 2022; Pritzke, Fenigsen, Wilce (eds.), 2020; Wierzbicka, Harkins, 2001; Wierzbicka, 2010; etc.]).

Emotional processes are fixed by means of a psycholinguistic mechanism, which reflects these processes in the semantics of certain words used to verbalize emotional states. The reflection of an emotional state in specific words manifests itself in the semantic structure of these words, which essentially forms the emotiveness of the word and its ability to reproduce specific emotional relationships depending on the context. The emotion in a word is preserved as an idea about it, which can "come to life," reflecting the corresponding emotion experienced by a person at the moment. Emotions penetrate into words, embed themselves in them, persist, and, when necessary, manifest, express themselves, and are recognized through these words. Thus, certain words can have an inherent "emotional force," determined by their meaning, associations, or usage in a specific context. The same principles apply to the dependence of the emotional impact of texts on the vertical context.

The second pivotal point of the study is the theory of polycode text perception. Through numerous experiments detailed in [Vashunina, 2007; Kreolizovannyy tekst..., 2020], it was established that illustration consistently alters the perception of a verbal text. This conclusion was drawn from the analysis of respondents' evaluations given to verbal texts and texts with various illustrations (polycode texts). The experimental method employed was the semantic differential method, wherein participants were asked to evaluate objects using unipolar or bipolar scales of a specified dimension (usually five- or seven-point

scales). Evaluations given by respondents to different objects were then compared. For instance, we compared the assessment of a purely verbal text (without illustration) with the assessment of the same verbal text but with the addition of illustrations. The change in the evaluation of the verbal text depends not merely on the fact of adding an illustration, but on the parameters of the image: content, composition, form, color. Varying individual parameters of the illustration in many cases allows us to determine which characteristic of the image specifically causes the change in the text perception and evaluation. If a change in evaluation, influenced by a specific parameter of the image, is identified for texts of different content and style, it seems logical to assume that by using this parameter, we can regulate the perception of the text along a particular scale.

Experiment description

In this research, participants evaluated the suggested objects using scales created on the basis of a preliminary associative experiment. During this experiment, subjects were asked to provide characteristics for both texts and images. The frequency characteristics became the names of the scales. Additionally, a standard semantic differential (SD) was employed. Since the SD is associated with connotative aspects of meaning, it offers the opportunity to apply the SD method to the study of visual objects and polycode texts. This is due to the fact that these objects predominantly appeal to the connotative, emotional reactions of communication participants. These methods allow for the construction of semantic spaces and the identification of perception criteria that may not be consciously recognized by individuals. They also help categorize the presented objects. The data used for this paper were obtained from a series of previously conducted experiments. These data were processed using Principal Component Analysis and Varimax with Kaiser Normalization programs.

This is a brief overview of the experiments that progressively explored the semantic perception of creolized texts: in the first stage, the perception of texts with a single verbal component but varying visual components was assessed; in the second stage, evaluations of

different creolized texts with the same verbal component were compared; in the third stage, the image parameters that presumably caused the differing evaluations of the texts with identical verbal components were identified. The first series of experiments was fully described in [Vashunina, 2007]).

The experimental material consisted of 30 polycode texts in the Russian language on the topics "The Urals" and "A Snake" with various verbal components (in scientific-popular style and literary style: prose and poetry) and iconic components (two realistic images – graphic and pictorial, and three unrealistic ones – in natural, minor, and major color palettes), created according to specified parameters by students of an art school. Encyclopedic scientific-popular texts had to be selectively condensed (by removing excessive details and numerical data), while excerpts from fictional works were taken unchanged, within the volume allowed by the chosen format. Scientific-popular texts were compiled according to the requirements for educational materials, based on the processing of encyclopedic articles, and can be used in geography and zoology textbooks. The fictional texts include an original poem by the Russian poet I.A. Bunin (taken unchanged) and an excerpt from a story by T. Mayne Reid in Russian translation. Both texts can be used in literature and stylistics classes. Five illustrations were made for each of the six texts by students of an art school. Two of them were drawn in a realistic style. The other three are symbolic or contain symbolic elements. When creating these illustrations, the artists were not limited in their choice of styles, so illustrations of different styles were selected for different texts. Realistic illustrations consist of a graphic black-and-white drawing and a painted drawing (based on the graphic), created using natural colors. The basis of the three fantasy illustrations is also one drawing, executed in three variants: in black and white, in a cold color scheme, and in a warm color scheme.

The texts were evaluated using 50 semantic differential scales. The scales were the result of experimental selection. A group of subjects (totaling about two hundred people) was asked to characterize the verbal texts we selected using any definitions. Then the most frequently encountered characteristics were identified.

Using synonym dictionaries, the main member of the synonymic row was identified, which formed the basis of the scale. If an antonym was encountered during the characterization of the texts, a ready-made scale was obtained (for example, *anxious – calm*). In the absence of an oppositional member in the subjects' definitions, we resorted to the help of antonym dictionaries (Lvov, 1984). Since the scales were selected based on the definitions proposed by the subjects, some scales of classical SD were not included in the general list. It can be assumed that they are not relevant for the six selected texts. Approximately 1,500 native Russian-speaking students from various faculties at a pedagogical university (with at least 100 respondents for each text) were asked to read the texts and rate them using semantic differential scales.

The second series of experiments, the results of which are detailed in [Kreolizovannyy tekst..., 2020], involved four polycode texts, composed of images and verbal descriptions of of the featured images. A suprematist composition by K. Malevich and photographs of a city street, colored in minor (blue-lilac) and major (orange-pink) palettes, were used as iconic components in the polycode text. The verbal content is a compilative text composed by the experimenter from descriptions of the non-verbal part provided by the participants. The texts were evaluated using 34 semantic differential scales. The scales used by the participants to assess the content of the non-verbal part were taken from descriptions compiled by the participants themselves, relying on the images of their consciousness. The experiment involved 25 respondents for each text, residing in Moscow, aged 18–24 years old. The obtained total matrices were processed in the statistical package (SPSS) using factor analysis with subsequent rotation of factors to achieve a simple structure. During the experiment, the difference in semantic perception of the image, non-narrative text – description of this image, and creolized text composed of these two components was evaluated. The results can help creators of educational materials assess the pragmatic potential of illustrating descriptive texts.

The third series of experiments was described in detail in [Kreolizovannyy tekst..., 2020]). The experimental material included polycode texts (8), composed of four fictional prose verbal texts in Russian

(light-hearted and dark-sad in terms of emotional and semantic dominance) and two photographs of a street painted in blue-lilac (minor) and orange-yellow (major) tones. The verbal texts ranged from 270 to 300 characters and were excerpts from works of fiction. The texts were evaluated using 34 SD scales. The same scales as in series 2 were used in this series of experiments. This decision was made due to the need for a basis for comparison, which requires the presence of identical scales. The method of data processing and the number of participants were the same as in series 2. The results of the experiment can be used to predict changes in the perception of a literary text as a result of adding an illustration to it.

For this paper, the results connected with the emotional perception of the polycode texts are used. This material has not been previously analyzed or published. Some of the scales used in the experiments with semantic differentials assess the emotional perception of the received message. Several semantic differential scales coincide with the terms of emotions or emotional states (Anxiety – Anxious, Interest – Interesting, Sadness – Sad, Joy – Joyful), meaning that the evaluation on them fully reflects the recipients' perception of the text in the corresponding emotional key. The remaining scales name specific aspects of emotions. For instance, studying the changes in perception of educational text in these aspects can help create an effective educational resource by arousing interest and joy, avoiding the escalation of sadness, and regulating arousal. Let us clarify the basis on which certain scales were considered as evaluating some emotional state. Different explanatory dictionaries were used to analyze the meanings of the lexical units, from which the definitions facilitating comparisons were selected.

Stress / stress is defined as "a state of increased nervous tension, overstrain caused by some strong impact" (Ozhegov, 2007). As evident from the definition, one of the semes is 'tension,' so the quality referred to as the *tense* scale correlates with the emotional state of stress. When evaluating on bipolar scales, an antonym is chosen for the quality, resulting in the *tense – relaxed* scale. Anxiety is considered the first stage of stress [Metody..., 2020], based on this, we will consider the quality *anxious* as correlating with stress. By adding the antonym, we get the *anxious – calm* scale.

Hatred / nenavist is "a feeling of strong enmity, malice" (Ozhegov, 2007), and the corresponding qualities correlating with it would be hostile and malicious. By adding antonyms, we obtain the scales *hostile – friendly, malicious – kind*.

Anger / gnev is "a feeling of strong disapproval, indignation; a state of irritation, resentment" (Ozhegov, 2007). The corresponding quality expressed by an adjective is *angry* (hence, we get the scale *angry – kind*). Since anger is defined through other emotions, let us consider their definitions. *Indignation / negodovanie* is "outrage, extreme dissatisfaction" (Ushakov, 2008). Considering that a component of *dissatisfaction* is "negative attitude towards something" (Ushakov, 2008), we introduce the correlating quality *negative*, and thus, the scale *negative – positive*.

The state provoked by anger, including indignation, irritation, and resentment, when applied to a person, is hostility, which can escalate into aggression. On this basis, we include the quality *hostile* as correlating with the emotion of *anger* (thus, the scale *hostile – friendly*), as well as the scale *aggressive* (which can be considered a peripheral correlate, as anger, while often, but not necessarily is associated with aggression).

Satisfaction / udovletvorenie is "the feeling of someone satisfied with the fulfillment of their aspirations, desires, needs" (Ozhegov, 2007). We believe that the evaluation of this fulfillment can be positive, and accordingly, the correlating scales will be *negative – positive, bad – good*.

Compassion / sostradanie is "a feeling of pity, sorrow, caused by someone's misfortune, grief, experiencing someone else's grief as one's own misfortune" (Ozhegov, 2007). One of the meanings, according to the definition, is "someone else's as one's own," which can be denoted by the adjective *close* (thus, the scale *distant – close*). Also, based on the definition of the word *kindness / dobrota* ("responsiveness, a heartfelt disposition toward people, a desire to do good to others" (Ushakov, 2008) we relate compassion to kindness (the scale *bad – good*).

One of the meanings of the word *love / lubov'* – "a feeling of deep affection, selfless and sincere attachment" (Ushakov, 2008) – can be correlated with the characteristic *close* (the *distant – close* scale), based on the definition of attachment as a feeling of "closeness, based on

loyalty, sympathy to someone or something" (Ushakov, 2008). "Deep emotional attraction, strong heartfelt feeling" (Ushakov, 2008) – another meaning of the word – is related to the type of love – romantic love, so the scale *romantic* is considered correlating.

Surprise / udivlenie is "a state caused by a strong impression of something unusual, unexpected, strange, incomprehensible; amazement" (Ushakov, 2008) – associated with the perception of the unusual and incomprehensible, so the scales *ordinary – unusual, trivial – original, incomprehensible – understandable, natural, commonplace* correlate with it.

Offense / obida is "unfairly inflicted sorrow, offense, as well as the feeling caused by it" (Ushakov, 2008), and one of the meanings is *injustice*, which is reflected in the scale *unjust – just*.

Contempt / prezrenie is "such an attitude towards someone or something that is caused by recognizing someone or something as unworthy, undeserving of respect, vile, morally low, insignificant" (Ushakov, 2008). We considered it possible to correlate such characteristics as *primitive* – "not deep enough, too simplified; morally undeveloped" (Ushakov, 2008) and *unnecessary* – "such that there is no need, necessity; superfluous, useless" (Ozhegov, 2007) with this emotion, as both of these adjectives are related to the concept *insignificant*.

Pleasure / udovol'stvie is "a feeling of joy from pleasant sensations, experiences, thoughts" (Lvov, 1984). In accordance with this interpretation, the emotion of pleasure correlates with the qualities *pleasant, attractive, beautiful* (accordingly, the scales *pleasant – unpleasant, beautiful – ugly, attractive – repulsive*).

Disgust / otvrashchenie is an "extremely unpleasant feeling caused by someone or something" (Lvov, 1984). Characteristics such as *unpleasant* (negative pole of the scale *pleasant – unpleasant*), *repulsive* – "inspiring dislike, repulsion towards oneself" (Lvov, 1984), and *ugly* – "producing a repulsive, unpleasant impression with its appearance" (Lvov, 1984) are related to this emotion. Thus, the corresponding scales are *unpleasant – pleasant, ugly – beautiful, repulsive – attractive*.

The emotion of *sadness / pechal'* has correlating characteristics *sad* and *dark* (one of the meanings is "sad, gloomy, joyless" (Lvov, 1984)), corresponding to the scales *sad – happy, dark – bright*.

The emotion of *joy / radost'* is associated with characteristics *joyful* and *bright* (in the sense of "joyful, unclouded, pleasant" (Lvov, 1984)), with the scales *joyful – sad, bright – dark*.

If we consider the correlation of the evaluative scales with the emotional states, the following picture emerges (see Table 1). The left column lists the terms of emotions and emotional states, and the right column contains the scales that allow assessing the degree of expression of this emotion or state in the text during its perception by the recipient. In one part of the experiments, bipolar scales were used, while in another part, unipolar scales were used (they are italicized in the table). In bipolar scales, the first position lists the quality relevant to the corresponding emotion, and the second position lists its antonym. For example, for the emotion of pleasure, the scale looks like *pleasant – unpleasant*, and for the emotion of disgust, it looks like *unpleasant – pleasant*. Unipolar scales can represent both the quality relevant to the expression of the emotion and its antonym (antonyms are underlined).

Some bipolar scales can be considered as contrasting emotions and emotional states (see Table 2). Primarily, these are scales that coincide for opposing emotions in Table 1, where the actualization of different poles is implied. However, there is an exception – the scales *picturesque* and *exquisite*, related to the emotion *Pleasure*, do not correlate with the emotion *Disgust*, which is opposed to *Pleasure*, because non-picturesque and non-exquisite stimuli are unlikely to evoke disgust. This is explained by the fact that the opposition of emotions is somewhat conventional, as each emotion is a unique human reaction, and as a result, emotions are only to a limited extent subject to structured representation.

In addition to the oppositions presented in Table 2, some scales, as evident from Table 1, correlate with multiple emotions. In *anxious – calm, calm* relates to *Stress* and *Anxiety*. The *hostile – friendly* scale associates with *Hatred, Anger. Negative – positive* connects with *Anger, Satisfaction. Distant – close* corresponds to *Compassion* and *Love*.

Results

As seen from Table 1, the established correlations between emotions and emotional states with the semantic differential scales cover

Table 1. **Correlation between semantic differential scales and emotions/emotional states**

№	Emotion/ emotional state	Semantic differential scale
1	Stress	Exciting – Calming Anxious – Calm ***Calm***
2	Anxiety	Anxious – Calm ***Calm***
3	Hatred	Hostile – Friendly Angry – Kind
4	Anger	Hostile – Friendly Negative – Positive Angry – Kind *Aggressive*
5	Satisfaction	Positive – Negative Good – Bad
6	Compassion	Close – Distant Kind – Angry
7	Love	Close – Distant *Romantic*
8	Surprise	Unusual – Ordinary Original – Banal ***Natural*** ***Understandable*** ***Ordinary***
9	Interest	Interesting – Uninteresting
10	Resentment	Unjust – Just
11	Contempt	Unnecessary – Necessary *Primitive*
12	Pleasure	Pleasant – Unpleasant Beautiful – Ugly Attractive – Repulsive *Pleasant* *Exquisite* *Picturesque*
13	Disgust	Unpleasant – Pleasant Ugly – Beautiful Repulsive – Attractive ***Pleasant***
14	Sadness	Sad – Happy Dark – Bright
15	Joy	Happy – Sad Bright – Dark

Table 2. **Opposition of emotions through semantic differential scales**

Emotions/ emotional states	Scales
Hatred – Compassion	Hostile – Kind
Disgust – Pleasure	Unpleasant – Pleasant, Ugly – Beautiful, Repulsive – Attractive, Pleasant
Sorrow – Joy	Sad – Happy, Dark – Bright

various aspects of text content. Since visual characteristics have been identified during the experiments that influence the evaluation of the creolized text according to the listed scales with a certain probability, it is possible to forecast changes in the semantic perception of the text when using these visual characteristics.

Let us consider the possibilities of adjusting the emotional state of *Stress* by varying the image

visual characteristics, which change the text evaluation on the scales *exciting – calming* and *anxious – calm*. The latter scale also regulates the perception of the emotional state of Anxiety.

Exciting – calming. The perception of the text as exciting is heightened by the brightness of the image – the brighter the illustration, the higher the assessment of the text as exciting is. Regarding the color palette, more often it involves

colors from the major scale, although the use of saturated bright colors from the minor scale is possible. The *calming* quality is associated with the paleness of the image in the minor color palette.

The perception of the text as *calm* is associated with realistic illustrations and the clarity of the image. Complex identifiability of objects, ambiguity, and originality "cause anxiety" (as with everything unknown and unclear). However, objects do not necessarily have to be unclear. As the results of one experiment showed, the use of pale graphics (black-and-white graphic illustration) also complicates the immediate recognition of the objects in the illustration and leads to an increase in the evaluation of the text as anxious. Additionally, an increase in the evaluation of the text as calm occurs when using deep blue color and rounded geometric shapes, while angular sharp forms in the illustration elevate the evaluation of the text as anxious.

Let us consider the possibilities of altering the perception of the emotion Hatred by modifying the text evaluation on the scales of *hostile – friendly*, *evil – kind*. Sharp objects and forms are perceived as evil and hostile. Our analysis revealed colors and color combinations in illustrations that elevated the text evaluation as *hostile* and/or *evil*: purple with a dirty hue, burgundy spots on green, on blue-purple, black with yellow and blue. Similarly, in some cases, the black-and-white color scheme (graphic illustrations) had the same effect. Texts with unpleasant recipient images (in our analysis, these were images of snakes) were also assessed as more hostile. In other words, hostile and evil are associated with sharp, black, unpleasant. The increase in text evaluations as kind and friendly may be linked to colors of the major scale, as well as explained by the content of the image: a realistic depiction of an object that is perceived as *kind* and *friendly*.

A high rating on the *aggressive* scale was observed when using bright red color, as well as when the image conveyed a sense of attack (in our analysis, an image with a sensation of falling and pseudo-motion of a large object towards the viewer). Texts with illustrations in a realistic style and natural color scheme (without "aggressive" objects) were perceived as least *aggressive*. An interesting trend was discovered during the analysis: texts with illustrations in an unnatural

color scheme were rated as more aggressive compared to texts in a natural scheme. We hypothesized that imposing one's vision is perceived as aggression, a notion that should be further explored.

Compassion is associated with qualities of *kind – evil* (see above), *close – distant*. Warm colors create a sense of closeness, while cold colors evoke a sense of distance. Black-and-white (graphic) illustrations are also perceived as more *distant*. The visual representation of *closeness* is also linked to the presence of this quality in the depicted object itself, in which case the rating increases for texts with realistic illustrations in natural colors.

Love, in addition to the *close – distant* scale, correlates with the *romantic* scale, where the use of pink color increases the rating, while the suprematist composition as an illustration decreases it.

Surprise is associated with ratings on the scales *unusual – ordinary*, *original – banal*, *natural*, *understandable*, *common*.

Texts with unconventional illustrations (fantastical, in unnatural color schemes) are perceived as the most *unusual* and *original*, while texts with realistic illustrations (especially graphic ones) are considered *ordinary* and *commonplace*.

Texts with realistic illustrations are also seen as the most *natural* and *understandable*, whereas texts with fantastical illustrations receive the lowest ratings on these scales.

The emotion of Interest correlates directly with the *interesting – uninteresting* scale. In our analysis, texts with realistic images were often rated as more *interesting*, especially if the object depicted did not evoke aversion. Texts with unpleasant recipient images or with pale graphic illustrations tend to be rated as less *interesting*.

The emotion of Offense correlates with the *unfair – fair* scale. Ratings on this scale in approximately half of the cases can be explained based on image parameters. In other cases, correlations with image form are not evident, likely because fairness is a complex ethical concept weakly associated with external form. The use of color schemes that do not match the image content, as well as the complexity and some ambiguity of the illustration, may lead to higher ratings of text as *unfair*. Texts with realistic illustrations and illustrations whose color scheme

matches the image content are often rated as more *fair*.

The emotion of Contempt/Disdain is related to the scales of unnecessary-necessary and primitive. Texts with images that evoke dislike, as well as those with graphic illustrations, are perceived as more unnecessary. Texts with realistic illustrations are often considered more necessary.

The texts with trivial (realistic) illustrations are rated as more primitive.

The emotions of Pleasure and Disgust are somewhat antonyms, therefore they correlate with different poles of the same scales: *pleasant – unpleasant*, *beautiful – ugly*, *attractive – repulsive*.

The rating of a text as *pleasant* increases when combined with a realistic image, provided the object does not evoke dislike. Conversely, the rating of a text as *unpleasant* increases, which also occurs in some cases with the use of an unnatural or disharmonious color palette, as well as dark, gloomy tones. In some instances, texts with unconventional images are rated as the most *pleasant*. Generally, texts with a dark-sad verbal component are perceived as less *pleasant* than texts with a light-cheerful verbal component. Regarding specific colors or color palettes, it is difficult to determine which coloristic solution will be more pleasant to recipients. This is related to the specificity of perceiving a creolized text: a fusion, a synthesis of components occurs. In our material, there were instances where a higher rating as *pleasant* was given to an illustration in a major color palette, while the most *pleasant* text was rated in combination with an illustration in a minor color palette.

The evaluation of texts as *attractive* did not show unequivocal results. In half of the cases, texts with realistic images were found most *pleasant*. Similarly, texts with illustrations in a major color scheme are often rated as more *pleasant*. The same image parameters increase the assessment of the text as *beautiful*. Texts with illustrations that cause aversion in content and form, as well as with black-and-white (graphic) illustrations, are often rated as more *repelling* (the latter parameter also increases the assessment of the text as *ugly*).

The emotion of pleasure is also associated with the scales of *exquisite* and *picturesque*.

In the analysis of ratings on the exquisite scale, it was found that they increase with the addition of illustrations in a major color scheme. A decrease in ratings was observed when a suprematist composition by K. Malevich was used as an illustration. If a bipolar scale were composed (in our experiment the scale was unipolar), it would appear as *exquisite – crude* (Ozhegov, 2007). Simple geometric forms in the composition can be seen as *crude*, and it can be considered that the decrease in ratings on the *exquisite* scale occurs with the use of simple geometric forms in illustrations (likely only possible for abstract-style illustrations).

On the *picturesque* scale, the suprematist composition is also rated low. The understanding of picturesqueness is likely related to the perception of a plot or the experiencing of emotions.

According to the Ozhegov dictionary, picturesque is defined as "beautiful, worthy of an artist's brush," "vivid, imaginative, expressive" (Ozhegov, 2007). Texts with colorful realistic illustrations are rated high.

The emotions of Sadness and Joy are antonyms and correlate with different poles of the scales: *sad – joyful* and *dark – light*.

Texts with illustrations in a minor color scheme, as well as with black-and-white images, are perceived as more *sad*. The addition of a realistic image of an unpleasant object can raise the assessment of the text as *sad*. The enhancement of the text as joyful occurs with the addition of illustrations in a major color scheme, as well as realistic images of pleasant objects.

The opposition of *dark – light* is subject to clear representation. Adding a dark illustration increases the rating of the text as *dark*, while adding a light illustration increases the rating of the text as *light*.

Interpretation of experimental results

Thus, the sensation of *Anxiety* is associated with some ambiguity and originality of the image, the use of sharp angular forms, while deep blue color and rounded, especially amorphous geometric shapes reduce this sensation. These same parameters regulate the emotional state of Stress, with the stressogenic parameter of the image also being its brightness (especially bright red, orange, yellow colors), whereas pale minor tones of the image reduce the sensation of Stress.

The emotion of *Hatred* is associated with images of unpleasant objects, sharp forms, the use of black color, and certain color combinations (specific combinations are difficult to name because the impact potential can only be determined for a specific color stimulus), the main characteristics of which are the saturation of colors and the presence of dark colors. Hatred is weakened by the use of warm colors in a major scale and images of pleasant objects, which are perceived as kind.

The same image parameters regulate the perception of the emotion of *Anger*. To these, the use of unnatural color palettes, dark, gloomy tones, and large fragments of bright red color are added, as well as images depicting movement toward the viewer in the illustration. The weakening of the emotion occurs with the addition of an illustration in a realistic manner and natural colors, if its content does not evoke a sense of aggression.

The emotion of *Satisfaction* is enhanced by adding an illustration in a realistic style and natural colors (of course, the content of the image also plays a significant role), and is weakened by the use of unnatural color palettes, dark, gloomy tones.

The emotion of *Love* is associated with the use of warm tones in illustrations, primarily shades of pink. This emotion is weakened by adding geometric compositions (such as Suprematism) to the text, as well as by using cold colors in illustrations.

The emotion of *Surprise* is regulated by the degree of triviality of the illustration: non-trivial images evoke surprise, while expected realistic illustrations do not provoke this emotion.

The emotional state of *Interest* when combined with verbal text and a realistic illustration can be strengthened (in most cases) or weakened (if the illustration depicts an unpleasant object). Interest is also diminished by pale graphic illustrations.

The emotion of *Contempt/Disdain* is intensified by the presence of objects in the image that are unpleasant to the recipient and/or unaesthetic forms. As for the realism of the image, its impact can be bidirectional: this parameter can either weaken or intensify this emotion (if the image is perceived as primitive).

The emotion of *Pleasure* is enhanced by adding a realistic illustration, provided the object does not evoke dislike in recipients. In some cases, this emotion can be intensified by using a major color palette in the image.

The emotion of *Disgust* can be intensified by adding a realistic image of an unpleasant object, as well as a graphic illustration.

The emotion of *Sadness* is intensified by adding a dark/black and white/minor illustration, as well as if the image object is unpleasant to the recipients.

The emotion of *Joy* correlates with light illustrations, a major color palette, and the realistic depiction of pleasant objects.

Conclusions

The correlations found between the visual parameters of illustrations and the emotions elicited by text prove that it is possible to adjust the emotional perception of text by varying certain image parameters.

The style of the illustration affects the emotions of the recipient. Some ambiguity and originality in the image increase *Anxiety*, *Surprise*, and *Offense*. The impact of a realistic illustration is not unidirectional. Depicting unpleasant objects increases *Hatred*, *Anger*, *Contempt*, *Sadness*, and decreases *Interest*. Depicting pleasant objects increases *Interest*, *Pleasure*, *Joy*, and decreases *Hatred* and *Anger*. Geometric compositions (in our case, Suprematism) decrease *Love*.

The composition of the image and geometric shapes play a specific role. Depicting motion towards the viewer increases *Anger*. Using sharp, angular forms increases *Anxiety*, *Hatred*, and *Anger*. Rounded, especially amorphous geometric shapes decrease *Anxiety*.

Color has a significant impact potential. An unnatural color palette increases *Anger*, *Offense*, *Disgust*, and decreases *Satisfaction*. A natural color palette increases *Satisfaction* and decreases *Anger* and *Offense*. Brightness increases *Stress*, while pale minor tones weaken this state. Dark tones increase *Hatred*, *Anger*, *Sadness*, and decrease *Satisfaction*, *Love*. A black-and-white color palette increases *Hatred*, *Anger*, *Disgust*, *Sadness*, and decreases *Interest*. Major colors increase *Stress* (bright), *Love* (especially shades of pink), *Pleasure*, *Joy*, and decrease Hatred, Anger (except for aggressive red). Deep blue color decreases *Anxiety*.

Based on the results of the experiments, it can be concluded that image parameters often regulate not just one emotion but several at once. This phenomenon must be considered when attempting to manage the perception of a verbal message through creolization.

In conclusion, a few words should be said about the implications of this and similar research: understanding how visual elements influence emotional responses to text can be informative for the development of emotion-aware text processing algorithms in NLP. By integrating visual analysis techniques with text processing models, NLP systems can better understand and respond to the emotional nuances of human communication. From a cognitive science perspective, the research provides insights into how visual stimuli interact with cognitive processes to shape emotional experiences. Understanding these mechanisms can contribute to theories of emotion processing and cognition, advancing our understanding of human perception and behavior.

NOTE

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THE MATRIX OF COGNITIVE FILTERS AS A TOOL FOR THE ANALYSIS OF LINGUOCREATEMES IN MODERN ENGLISH DISCOURSE [1]

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Abstract. This study is devoted to the development of the author's method "The Matrix of Cognitive Filters" (MCF). It is used to model the process of inferring the meaning of creative elements (linguocreatemes) in multimodal online discourse. To accomplish this task, key cognitive mechanisms for generating the meaning of linguocreatemes were identified and researched. These are banner blindness, evaluative categorization and conceptualization, (de)compression of information and profiling, conceptual metaphor, conceptual metaphtonymy, and conceptual integration. Monomodal verbal and multimodal linguocreatemes (more than 18,000 units) were selected with a continuous sampling method from English-language Internet resources, visual and verbal corpora. Theoretical analysis showed that the MCF can be used to model the overall ability of a linguocreateme to initiate cognitive resonance in a recipient. This method also allows for the collection of data on the probabilistic prediction of the level of cognitive resonance and positive or negative dissonance in an addressee. The empirical data obtained during a practical linguistic-cognitive experiment among English-speaking respondents from across countries confirmed the theoretical results of the study. The participants had to infer the general meanings of several multimodal linguocreatemes in accordance with the MCF. The experiment confirmed the feasibility of using this method to assess the occurrence of cognitive resonance, positive or negative dissonance, as well as obtaining additional data on the recipient's reactions to different linguocreatemes in English online discourse.

Key words: matrix of cognitive filters, linguocreateme, cognitive mechanism, categorization, metaphor, metaphtonymy, integration.

МАТРИЦА КОГНИТИВНЫХ ФИЛЬТРОВ КАК ИНСТРУМЕНТ ДЛЯ АНАЛИЗА АНГЛОЯЗЫЧНЫХ ЛИНГВОКРЕАТЕМ В СОВРЕМЕННОМ ДИСКУРСЕ [1]

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Аннотация. Исследование посвящено разработке авторского метода «матрица когнитивных фильтров» (МКФ), который может быть использован для моделирования процесса инферирования смысла лингвокреатем в мультимодальном онлайн-дискурсе. Для решения данной задачи выявлены и изучены такие ключевые когнитивные механизмы генерации значения лингвокреатем, как баннерная слепота, оценочная категоризация и концептуализация, компрессия и декомпрессия информации, профилирование, концептуальная метафора, концептуальная метафтонимия и концептуальная интеграция. Материалом для анализа послужили мономодальные вербальные и мультимодальные лингвокреатемы, отобранные из англоязычных интернет-ресурсов, визуальных и вербальных корпусов. Сформулировано положение о том, что МКФ можно использовать для моделирования общей способности лингвокреатемы инициировать у реципиента когнитивный резонанс, а также получения данных о вероятностном прогнозировании уровня когнитивного резонанса и положительного или отрицательного диссонанса у адресата. Эмпирические данные, собранные

в ходе практического лингвокогнитивного эксперимента среди англоговорящих респондентов из разных стран, подтвердили теоретические результаты исследования. Участникам предлагалось сделать выводы об общих смыслах нескольких мультимодальных лингвокреатем в соответствии с МКФ. Эксперимент подтвердил целесообразность использования данного метода для оценки возникновения когнитивного резонанса, положительного или отрицательного диссонанса, а также получения дополнительных данных о реакциях реципиента на различные лингвокреатемы в англоязычном онлайн-дискурсе.

Introduction

In early studies, linguistic creativity as a speech communication strategy was traditionally considered a characteristic poetry feature. However, the area of human speech, oriented towards the creative implementation of the language potential resources as the focus of modern research, is much broader and includes various text types (e.g., artistic, conversational, advertising, journalistic, epistolary, etc.).

In recent years, cognitive linguistics has sparked interest in the study of linguistic creativity that through various cognitive tools realizes both the potential of language systems and the creative abilities (often intuitive) of the linguistic personality. One of the central provisions of cognitive linguistics, influencing the correct interpretation of the essence of the linguistic creativity phenomenon, is the idea of the language direct involvement in the process of cognition, the interpretation of information about the world, and the formation of previously non-existent knowledge structures. In this case, language fulfils the cognitive and communicative intentions of the linguistic personality [Boldyrev, 2020], and linguistic creativity expresses its interpretive function. The phenomenon of linguistic creativity as an integral component of verbal thinking is also based on the deformation and switching of stereotypes and relations existing in the individual's consciousness.

In the last few decades, the study of linguistic creativity has employed the postulate that in discourse, the linguistic sign realizes its associative potential as the interrelation between form and content [Gridina, 1996]. As a means of cognition, inference and interpretation, and the creation of new concepts, language contributes to the fulfilment of the communicative and cognitive intentions of interlocutors [Boldyrev, 2020; Gurevich, 2022; Lakoff, Johnson, 1980]. A typical communicant, being able to think creatively, can use the potential inherent in linguistic units and model innovative elements of discourse based on associative rapprochements, which is especially relevant in the era of verbal emancipation of the 21st century. What is more, modern discourse studies view it as the area of realization of the creative potential of both the language system and the linguistic personality [Fauconnier, 1985; Forceville, 2009; Golubkova, Taymour, 2021; Karabulatova et al., 2021; Zhang et al., 2023]. We also consider it crucial that linguistic creativity as a violation of habitual linguistic behavior is typical for communicants with flexible intelligence, distinguished by originality, spontaneous flexibility, efficiency, divergence and associative thinking, the ability to rethink, and a developed sense of humor.

Virtual communication in online mode activates the process of generating an increasing number of complex (or multimodal) texts, which are a collection of culturally established, socially formed semiotic resources that produce meaning from a variety of modalities. The texts that combine semiotically heterogeneous sign systems represent an inherent part of the culture of the 21st century society.

These semiotically heterogeneous texts continue to evolve, providing previously unknown opportunities for global communication. Over the past few decades, they have been the focus of scientific interdisciplinary research. Hence, it seems vital to analyze the pragmatic properties of various multimodal creative texts of modern English-language discourse. In addition, it is crucial to determine the relationship between generating

and deciphering creativity and the author's internal cognitive processes.

Materials and methods

The research material included more than 18,450 samples of monomodal verbal and multimodal linguocreatemes, selected by a continuous sampling method from English-language Internet resources (periodicals, advertising agency websites, TV shows, podcasts, websites of commercial and non-profit organizations, foreign social networks, comics for teenagers and adults, fiction works, collections of road signs); visual corpora Google Images, Pinterest Creative Ads, VisMet, VisMet Baby, Ads of the World, Adevee и Best of Behance; verbal corpora British National Corpus, The Corpus of Contemporary American English, Natsionalny Korpus Russkogo Yazyka (The Russian National Corpus). The collection comprises multimodal linguocreateme of commercial advertising (more than 15,000 units) and social advertising, including Internet demotivators. The work uses materials from explanatory and specialized dictionaries and lexicographic and specialized online sources.

The study aims to develop a concept of cognitive mechanisms interaction used to infer meanings of multimodal linguocreatemes resulting from the interplay of their constituent multi-code elements. It also seeks to identify a degree of influence of various modalities and basic cognitive mechanisms on successful meaning inference of linguocreateme in virtual communication in modern English-language digital Internet discourse.

It is possible to achieve the study's goal if the following is done:

1) analyzing the features of the main cognitive mechanisms activated in the recipient when inferring the meanings of multimodal linguocreatemes;

2) developing an original method for multi-level analysis of multimodal linguocreatemes "the matrix of cognitive filters" (the MCF), taking into account the specifics of the simultaneous functioning of the main cognitive mechanisms;

3) analyzing the principles of the emergence of cognitive resonance (or dissonance) in multimodal linguocreatemes;

4) designing and conducting a linguocognitive experiment using the MCF to empirically determine the factors influencing the occurrence of cognitive resonance, positive and negative dissonance.

The following methods are used to accomplish the study: a continuous sampling method for selecting multimodal material from online sources in English; general scientific methods of cognition such as analysis, synthesis, comparison, and generalization; methods of cognitive and discourse analysis; the author's method of analyzing multimodal metaphorical linguocreatemes "the matrix of cognitive filters" (the MCF).

Results and discussion

Technologization of the language of communication is a peculiar feature of the linguistic situation in the modern world. The term 'technologization' refers to the infiltration of the Internet into areas previously exclusively occupied by offline communication. Technologization also promotes the use of specific vocabulary in virtual reality in online discourse [Gapanyuk et al, 2024]. This vocabulary has both socio-cultural characteristics and individual linguistic features due to the functional and socio-cultural specifics of its appearance, use and distribution. It is highly metaphoric and descriptive as it combines the elements of different styles and retains some features of professional and technical jargon, common lexis and informal gaming vocabulary. It also displays the features of oral and written speech and is governed by the inner laws of a particular language. We assume that the function of these lexical units is to increase the effectiveness of virtual communication in a digital society and a digital language [Taymour, 2022]. In addition, the nomination of realities that have arisen due to the emergence of the Internet is necessary to eliminate gaps in the standard vocabulary.

Quite often, such lexical units consist of verbal and non-verbal elements, and the term "linguocreateme" seems to be most suitable for describing the products of linguistic creativity in multimodal online discourse (cf. createme, expresseme). Of course, linguocreatemes may be found in offline discourse, too (e.g. street billboards), but, in this research, we explore only Internet communication. We understand a

linguocreateme as a small-format creolized Internet text, a unit of information and communication, which is a cognitively stimulating sign complex that arises as a result of creative personal rethinking and modification of existing linguistic and extralinguistic realities. A linguocreateme includes a set of ideas transmitted in the process of oral or written communication to the recipient to achieve a certain communicative effect, which often provokes the effect of defeated expectancy and cognitive dissonance [Taymour, 2023]. Undoubtedly, the intended pragmatic effect plays a vital role in this process. When achieved, we state the presence of cognitive resonance as the state of quality understanding [Festinger, 1957]. Otherwise, cognitive dissonance (or mental tension) occurs and causes malfunctioning or even failed communication.

The working hypothesis of this study is the following statement: deciphering the meaning of a linguocreateme occurs when some specific cognitive mechanisms that generate it are activated. Modeling this process, for obtaining theoretical and empirical data on the probabilistic prediction of cognitive resonance and dissonance, can be done by conducting a linguocognitive experiment among English-speaking respondents.

To prove or refute the proposed hypothesis, we studied the features of the functioning of the following cognitive mechanisms: the cognitive mechanism of conceptual metaphor; the cognitive mechanism of conceptual integration; the cognitive mechanisms of evaluative conceptualization and categorization; the cognitive mechanism of compression and decompression; the cognitive profiling mechanism (including banner blindness); the cognitive mechanism of conceptual metaphtonymy.

Having studied the cognitive mechanism of conceptual metaphor, we proved that the internal structure of most linguocreatemes is determined by the primary metaphors in their composition, where a primary metaphor is a metaphor connecting basic physical and mental experiences (e.g. GOOD IS UP) [Grady, 1997]. Drawing on the selected empirical material (commercial and social advertising, comics, memes, demotivators, etc.), the following most frequent primary metaphors were extracted: GOOD IS BRIGHT, BAD IS DARK, IMPORTANCE IS SIZE, IMPORTANCE IS VOLUME, IMPORTANCE IS CENTRAL POSITION, UNDERSTANDING IS SEEING, CONTROL IS BEING ABOVE, SIMILARITY IS PROXIMITY.

The cognitive mechanism of profiling is an individual mental ability to distinguish between the main and the secondary as a result of the process of "highlighting", the imposition of the most relevant/main meaning within the boundaries of a certain conceptual area, existing on the basis of specific conceptual content. We consider the cognitive profiling mechanism as two parallel mechanisms of focusing and defocusing. As the study showed, the ultimate version of defocusing is the cognitive mechanism of banner blindness, defined as a protective mental mechanism activated when one directs their selective attention exclusively to those discursive elements that meet their current communicative needs and help achieve certain goals.

The cognitive mechanism of information (de)compression is constantly activated when a recipient interacts with polycode linguocreatemes. Its analysis has shown that an individual constantly "archives" vast amounts of knowledge and then "unarchives" it at the required time. In the presence of verbal and non-verbal semiotic resources in a single element, (de)compression of information is more versatile, and the recipient faces an additional cognitive challenge when extracting the underlying meanings. In this study, we identified three main models according to which embedded meanings are archived and then, accordingly, unarchived when the information decompression mechanism is activated:

1) non-verbal dominant information compression;

2) verbal-dominant compression of information;

3) complementary information compression.

Having researched the features of the cognitive mechanism of conceptual integration, we determined that in multimodal discursive elements, in most cases, the availability of more than two input spaces is observed due to additional components from different semiotic systems.

The general metaphtonymic model can be represented as $Z = (X$ instead of $Y)$, WHERE $(Y$ is $W)$, where Z is the final meaning of the new discursive conceptual unit, formed as a result of the functioning of the cognitive mechanism of metaphtonymy, $(X$ instead of $Y)$ – metonymic

associative transfers; (*Y* is *W*) – metaphorical associative transfers. The analysis of the cognitive mechanism of metaphtonymy for multimodal linguocreatemes made it possible to identify eight main cognitive metaphtonymic models:

1) double metonymic expansion of one metaphorical source within one target domain;

2) double metonymic extension of one metaphorical source within two target domains;

3) double metonymic extension of two metaphorical sources within two target domains;

4) double metonymic extension of two metaphorical sources within three target domains;

5) triple metonymic extension of one metaphorical source within one target domain;

6) metonymic expansion of one metaphorical source within two target domains;

7) metonymic expansion of two metaphorical sources within one target domain;

8) metonymic extension of three metaphorical sources within one target domain.

We consider the effect of cognitive resonance as a successful result of the described above cognitive mechanisms functioning, which are involved in deciphering the meaning embedded in a discursive element. In case the cognitive programs of the communicants coincide, the cognitive synchronization allows the addressee to infer those inherent meanings intended by the author, form a general mental representation of the object of discourse, and, in some cases, generate new meanings.

In this research, cognitive dissonance is defined as an anti-concept of cognitive resonance. It is mental tension that can arise in the process of communication when a recipient misunderstands the meanings of certain linguocreatemes. As the results showed, dissonance can appear due to the following factors: the discrepancy between the meanings of verbal and nonverbal elements and the cognitive contexts behind them; too high level of information compression; lack of background knowledge on the part of the addressee; the failure of the cognitive mechanism of conceptual integration or metaphthonymy, etc.

We have determined that the vast majority of linguocreatemes provoke defeated expectancy. A certain level of cognitive dissonance is necessary to attract the attention of the addressee and activate his or her mental and intellectual efforts to overcome the created tension.

A recipient can overcome the resulting cognitive discomfort by a sudden insight ("insight") on an intuitive level. In this paper, we proposed to consider this type of cognitive dissonance as positive. However, if the intensity of tension exceeds a certain threshold of individual potential cognitive capabilities, the required communicative effect may not be achieved. This level of cognitive dissonance is proposed to be considered as negative. Thus, the difference between cognitive resonance and positive cognitive dissonance lies only in the amount of mental energy expended on the part of the addressee when inferring the meanings of a creative discourse element. Since the most important factor in the processes and mechanisms of linguocreateme meaning formation is the success or failure of explication of the meanings embedded in them, the study uses the terms "cognitive resonance" and "positive cognitive dissonance" interchangeably.

The research aims to develop a cognitive model of linguocreatemes in multimodal discourse to identify their strategic communicative potential and the level of achievement of the author's set pragmatic goals. To accomplish that, we attempted to model the cognitive resonance of a linguocreateme. It includes a cumulative analysis of the cognitive mechanisms of meaning formation, ordering them and developing the matrix of cognitive filters. The term denotes a generalized cognitive model of a creative discursive element (mono- or multimodal creative theme) that allows one to determine the approximate level of its mental resonance. The model represents a six-level system of step-by-step analysis of the cognitive mechanisms functioning resulting in a linguocreateme meaning inference:

Filter 0 – Level of banner blindness.

Filter 1 – Level of evaluative categorization/conceptualization.

Filter 2 – Level of information compression and profiling.

Filter 3 – Level of conceptual metaphors.

Filter 4 – Level of conceptual metaphtonymy.

Filter 5 – Level of conceptual integration.

Result: Cognitive resonance/cognitive dissonance.

It should be taken into account that this scheme is ideal, and as it is not possible to look into the recipient's brain while it is working, we can assume that recipients can overcome certain

filters at different speeds. What is more, some filters may be absent at all or get activated in a different order.

We assumed that if deciphering a createme during a communicative act, the recipient overcomes all the filters, then, at the end of the inference process, it is possible to predict the presence of cognitive resonance in the addressee. If a linguocreateme meaning inference on the part of the recipient requires enhanced cognitive efforts (i.e., some filters that have different influences can "delay" it), then the probability of cognitive dissonance occurrence is high. However, the recipient can often overcome the filters by investing more time and mental energy. In this case, we propose to label cognitive dissonance as positive (PCD). If more cognitive efforts are employed but they do not help overcome the understanding threshold, the result may be labelled as negative cognitive dissonance (NCD). Often, the author sets the task of evoking a certain level of PCD in the target audience, which allows for better salience and memorability of the linguocreateme. But in certain cases, NCD occurs, which is a highly undesirable outcome of a communicative act.

Let us consider the features of the functioning of each filter that makes up the MCF exploiting one of the linguocreatemes (a social advertising poster) used in the linguistic-cognitive experiment conducted in this study (Fig. 1).

Filter 0 (the level of banner blindness) is crucial for determining the best location of a linguocreateme in a text. If a linguocreateme did not attract the recipient's attention or the recipient subconsciously ignored it for some reason, then we can immediately identify its communicative failure. The further analysis, hence, makes no sense. For this reason, when studying the MCF, we will by default believe that the recipient successfully overcomes Filter 0. However, the presence of this filter in the general scheme is necessary for the possibility of using the MCF not only for analyzing the decoding process but also for generating new linguocreatemes.

Filter 1 (the level of evaluative categorization/ conceptualization) has a constant influence on the process of inference of the general meaning of a certain amount of information coming from the outside world. The recipient simultaneously assesses its objective nature and properties and then compares the result obtained with the existing system of values. The study results show that the most frequent assessments rely on primary conceptual metaphors X IS GOOD and Y IS BAD. For approximation, we will consider conceptual metaphors that use both verbal and non-verbal levels. One of the examples is the primary metaphor THE DRIVER IS A POTENTIAL CRIMINAL. We can identify the following primary conceptual metaphors in many famous advertisements: NEW PERFUME IS GOOD (Nina Ricci commercial advertisement), OUTDATED COMPUTER IS BAD (Apple Inc. advertising campaign for the Mac computer), FOLLOWING THE RULES IS GOOD (social advertising for motorists, motivating to drive more carefully and to buckle up while driving),
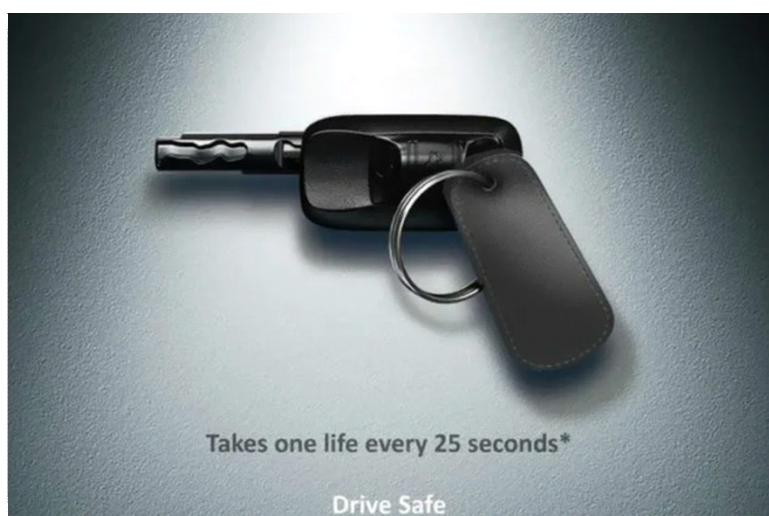
Fig. 1. Social advertising "Drive Safe"

SMOKING IS BAD (social advertising for smokers, motivating to quit the addiction), FREEDOM IS GOOD (political memes on the topic of Scotland's independence from the United Kingdom), FUNNY IS GOOD (monomodal malaphors that demonstrate individual creativity and a sense of humor). In the majority of cases, the author of a linguocreateme purposefully inbuilds into its basis a high probability of positive or negative evaluative categorization and conceptualization. We propose that the recipient overcomes Filter 1 if the author's integrated evaluative categorization/conceptualization approximately matches the recipient's evaluative categorization/conceptualization.

Filter 2 (the level of information compression) implies the embodiment of the principle of linguistic and non-linguistic economy, especially characteristic of modern English-language multimodal discourse. The nature of creative discursive elements initially contains the idea of compressing information necessary for the explication of general meanings. Deciphering the underlying meanings occurs in a sequence due to the activation of the cognitive profiling mechanism as alternate focusing and defocusing on various components of the linguocreateme. This filter is highly dependent on numerous personal qualities and background knowledge of the recipient. We accept the assumption that the target audience of a particular linguocreateme has approximately the same cognitive load, which the author is counting on. In the poster "Drive Safe", the recipient must be a motorist and recognize the ignition key on the poster. For example, to understand the malaphor "That's the way the cookie bounces" (1) (Malaphors.com), both the knowledge of the two idioms ("That's the way the cookie crumbles" and "That's the way the ball bounces") and the mental ability to overcome the effect of defeated expectancy are required while inferring the meaning. In commercial advertising, designers, as a rule, use verbal and non-verbal means to decipher the meanings of which the recipient needs general and permanent amounts of knowledge. It should be mentioned that the higher the specificity of a linguocreateme, the greater the likelihood of a breakdown in communication due to the occurrence of cognitive dissonance in the recipient. It is an often case in reaction-event internet memetics. Linguistic

creative neologisms also often depend on specific social, economic and political realities (i.e., numerous neologisms related to the COVID pandemic, many of which have now lost their relevance and require additional knowledge to decipher their meanings). Based on all of the above, we propose to consider Filter 2 as an "overcome" if the level of information compression does not exceed the maximum possible level of its decompression by an average member of the target audience.

Filter 3 (the level of conceptual metaphors) includes the identification and analysis of orientational, ontological and structural conceptual metaphors involved in the construction of a linguocreateme. Metaphors in discourse can be expressed by both linguistic and extralinguistic means. When identifying the presence of several different conceptual metaphors, we can think of a linguocreateme as a mixed metaphor (mono- or multimodal). In this case, the iconic component can be seen as:

1) a visual metaphor-comparison, when the target domain and the source domain are present in the image and located in proximity/superimposed on each other;

2) a hybrid visual metaphor, when the constituent iconic elements belong to different conceptual areas and the explication of their meanings occurs due to the recipient's interpretation of the meaning of one component in terms of another;

3) a contextual visual metaphor, when the source domain is missing but can be restored out of the context;

4) an integrated visual metaphor, when the source domain resembles the target domain in form or content.

Our research has shown that a linguocreateme with an iconic component contains the key conceptual metaphors IMPORTANCE IS SIZE and IMPORTANCE IS CENTRAL POSITION. In the example above, an ignition key/gun occupies a central position in the text and represents the most important metaphor for the linguocreateme (DRIVING IS DANGEROUS). We propose that the recipient overcomes Filter 3 if a verbal or non-verbal expression of the metaphors is understandable to the recipient.

Filter 4 (the level of conceptual metaphtonymy) as a separate filter seems necessary to us because in many linguocreatemes the distinction between

metaphor and metonymy is impossible as both of them are the tools for conceptualizing and conventionalizing new human knowledge. It was shown earlier that the general metaphtonymic model can be seen as $Z = (X$ instead of $Y)$, WHERE (Y is W). In the poster "Drive Safe", one of the metaphtonymic transfers is (X instead of Y) – a key instead of a car; (Y is W) – the car is a danger. Monomodal linguocreatemes (e.g., mixed metaphors) are usually characterized by one metonymic extension of the metaphorical source within one or more source domains and target domains. For multimodal linguocreatemes, the following most common metaphtonymic schemes were identified: double metonymic expansion of one metaphorical source in the presence of a common target domain; double metonymic extension of one metaphorical source in the presence of two target domains; double metonymic extension of two metaphorical sources in the presence of two target domains; double metonymic extension of two metaphorical sources in the presence of three target domains. We propose to consider Filter 4 "overcome" if the process of metaphtonymic transfers proceeds in the manner intended by the author, and there is no interruption of transfers at the stages preceding the formation of the meaning of the linguocreateme.

Filter 5 (the level of conceptual integration) as a multidimensional model of metaphor allows us to analyze the nature of the general space and the mental spaces available, as well as those metaphorical linguistic and creative aspects that have an impact on the integrated meaning of the final blend. In this example, the meaning of the final blend is "driving is as dangerous as keeping and using a weapon, so you should be a careful driver." The general results of the research conducted within the framework of this study show that the number of mental spaces in multimodal linguocreatemes is on average 4–6 and are activated by both verbal and non-verbal elements. If the functioning of the mechanism of conceptual integration at one of the stages (e.g., inferring the meanings of one or more mental spaces) fails, this does not allow the formation of an integrated space of the required volume. In this case, we believe that the recipient does not overcome Filter 5. Otherwise, when the semantic content of the integrated space is the totality of all the meanings put in by the designers, coinciding with

the conclusions of the recipient, the filter can be considered "overcome".

This method can be used for analyzing the components that make up existing linguocreatemes, basing conclusions on the mental reactions of recipients, as well as analyzing potential target audience's reactions when creating new linguocreatemes. This can be especially true in commercial projects, such as advertising posters. Undoubtedly, when using the MCF, it is necessary to take into account the typical background knowledge and the main characterizing factors (education, gender, age, social status, etc.) of the average representative of the target audience. In this study, we propose to create an "addressee's avatar". For example, for the linguocreateme "Drive Safe," the addressee's avatar can be an adult citizen of one of the sexes who owns a car and has a driving license (which, as a rule, indicates a certain level of wealth). Linguistic and extralinguistic elements of such a linguocreateme should be selected according to these data. Violation of this rule increases the likelihood of cognitive dissonance or positive cognitive dissonance arising when the deep meanings laid down by the author are inferred. Undoubtedly, there is no single formula for creating a linguo-creative discursive element that is perceived equally by the absolute majority of addressees. It was quite convincingly proven by the linguistic-cognitive experiment conducted within the framework of this study.

The **linguistic-cognitive online experiment** was conducted among 334 English-speaking respondents from 11 countries. The purpose of the experiment was to analyze the functioning of the MCF and prove or disprove the working hypothesis stating that the MCF can be used as a tool for "dividing" the recipient's general impression of the linguocreateme into its constituent components. The experiment was intended to determine the probability of positive or negative cognitive dissonance or cognitive resonance occurrence in a recipient. To achieve this goal, the respondents were asked to analyze step-by-step several linguocreatemes representing commercial advertising, Internet demotivators and social advertising (including the poster "Drive Safe" above) and share their immediate reactions. The questionnaire was designed as follows: each linguocreateme was accompanied by six questions, and each question defined the result of passing one

of six cognitive filters. For the poster "Drive Safe", for instance, the open-ended Question 1 was formulated as "What is your first impression of the poster?" to identify the result of the cognitive mechanism of evaluative categorization/conceptualization. To identify the results of the action of other cognitive mechanisms by the MCF method, the following questions were asked: "Can you connect the poster to a real-life situation? Can you identify any hidden (perhaps metaphorical) meaning in this poster? Do you think some objects in the picture can be associated with some other objects? What is the most accurate meaning of this advertisement? What is your overall impression of this ad?"

The tables present the quantitative data with the percentage of respondents' answers (Fig. 2), on the basis of which conclusions were drawn about the level of success in overcoming a particular MCF filter.

In addition, recipients were asked to give a detailed answer to Question 6, which contributed to a more in-depth further analysis. For the poster "Drive Safe", some options were the following: "I felt very uncomfortable because the first thing I saw was a gun and it made me feel unsafe; A good metaphor, easy to understand, makes you think; I don't like shocking advertising, but this was easy to understand; This is a truly revealing ad that shows the responsibility of the driver behind the wheel." Based on these answers, the level of success in overcoming the last MCF filter was determined.

Conclusion

The study of meaning-making mechanisms in multimodal linguo-creative elements showed that:

– linguocreatemes of various types are widespread means of expressing an individual's linguistic creativity in modern English-language Internet discourse;

– linguistic creativity is one of the most essential aspects of the discursive activity of a linguistic personality, and, therefore, the development of new cognitive methods for analyzing the meaning of discourse elements that include various modalities is urgent;

– currently, the number of studies of multimodal linguocreatemes and the mental processes involved in their perception is relatively limited, which indicates the need for additional in-depth research.

To determine the level of cognitive resonance in the recipient when interacting with these units, we studied the mechanisms that form the meaning of multimodal linguocreatemes. It allowed us to solve the scientific problem of developing new effective methods for identifying the basic cognitive features of a multimodal linguocreateme.

The study of some cognitive mechanisms for generating the meaning of linguocreatemes allowed us to build a matrix of cognitive filters. The theoretical analysis and the practical linguistic-cognitive experiment have shown that the matrix of cognitive filters enables us to conduct a step-by-step

Poster 1 (Takes one life every 25 seconds. Drive safe)

Question 1. What is your first impression from the poster? (see Table 1)

A. it looks like a promotion	B. it looks like a warning	C. it looks like some funny pic
84.1%	12.7%	3.2%

Table 1. Poster 1, question 1

Question 2. Can you connect the poster to a real-life situation? (see Table 1)

A. yes, it's quite simple	B. yes, but I had to think	C. not really
61.9%	36.5%	3.2%

Table 2. Poster 1, question 2

Fig. 2. Respondents' answers (questions 1 and 2, poster "Drive Safe")

analysis. Recipients process the meanings of linguistic and non-linguistic components in linguocreatemes in their entirety, which confirms the working hypothesis of the study. The method used to qualitatively assess the level of perception of various linguocreatemes and the emergence of cognitive resonance, positive cognitive dissonance, and negative cognitive dissonance can be of pragmatic value for further theoretical research and commercial projects.

NOTE

¹ An abridged version of the article is published: Taimur M.P. The Matrix of Cognitive Filters as a Tool for the Analysis of Linguocreatems in Modern English Discourse. *Discourse in the Era of "Big Data": Variability, Creativity, Experiment*. Moscow, R. Valent Publ., 2023, pp. 328-336. (In Russian). URL: https://www.elibrary.ru/item.asp?id=54631633

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PENIAPHOBIA AS A COMPONENT
OF THE DESTRUCTIVE DIGITAL MEDIA DISCOURSE
IN THE ASIA-PACIFIC REGION [1]

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Abstract. Modern hybrid linguistic-mental and information warfare massively uses the promotion of destruction in the mass media as a tool of negative 'soft power' media discourse directed against China, Vietnam and Russia owing to their being the key players in the geopolitical arena of Southeast Asia. The discourse of Western geopolitical opponents promotes peniaphobia (fear of poverty), which is one of the basic human fears since it is associated with ensuring the efficient viability of man and human civilization as a whole. The authors attribute peniaphobia to one of the universal social stigmas that affect the social structure and culture of the community, recognizing that media discourse is actively using open public Internet communication to control public consciousness gently. Meanwhile, intense exploitation by the media of alleged financial insolvency, looming economic crises, food shortages and impending hunger, the adverse effects of international labor migration and the deplorable state of the labor markets rapidly generate protest moods in society, changing social perceptions of money, food and food consumption. Information intakes that enhance peniaphobia use scenario modeling the presentation of potentially dangerous themes in the mass media of Russia, Vietnam and China. The article assesses the manipulation of public consciousness in the context of the pandemic, complicated by the psychological and informational confrontation between East and West and Western socio-economic and political sanctions imposed in connection with the Russian-Ukrainian conflict. Modern social culture has updated the features of presenting information using a digital format and subsequent decoding, which, in general, has influenced social dynamics. Based on analyzing the ethno- and sociocultural behavior of 'digital aborigines' on the Internet, the sociocultural approach to modern manipulation techniques of the public consciousness demonstrates the change in the use of methods of manipulation compared to representatives of the 'pre-digital generation'.

Key words: media discourse, digital media discourse, peniaphobia, manipulation, Asia-Pacific countries, destruction, psychological warfare, information warfare.

ПЕНИАФОБИЯ КАК ЭЛЕМЕНТ
ДЕСТРУКТИВНОГО ЦИФРОВОГО МЕДИАДИСКУРСА
АЗИАТСКО-ТИХООКЕАНСКОГО РЕГИОНА [1]

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Аннотация. Современная гибридная лингвоментальная информационная война массированно использует продвижение деструкции в массмедиа как инструмент негативной «мягкой силы» в медиадискурсе, направленном против России, Вьетнама и Китая как ключевых игроков на геополитической арене Юго-Восточной Азии. Западные геополитические противники в своем дискурсе делают акцент на пениафобии (боязни нищеты), являющейся одним из базовых страхов человека, поскольку она связана с обеспечением эффективной жизнеспособности человека и человеческой цивилизации в целом. Авторы относят пениафобию к одной из общечеловеческих социальных стигм, влияющих на социальный уклад и культуру того или иного сообщества, признавая, что медиадискурс ориентирован на открытую публичную интернет-коммуникации для мягкого управления общественным сознанием. При этом муссирование тем якобы финансовой несостоятельности, грядущих экономических кризисов, недостаточной продуктовой обеспеченности и неизбежного голода, негативных последствий международной трудовой миграции и плачевного состояния трудовых рынков достаточно быстро формирует протестные настроения в обществе, трансформируя социальные воззрения на культуру денег и продовольствия. Для информационных вбросов, усиливающих пениафобию, применяется сценарное моделирование, при котором актуализируются потенциально опасные темы в массмедиа России, Вьетнама и Китая. В статье оцениваются манипуляции общественным сознанием в ситуации пандемии, осложненной психолого-информационным противостоянием Востока и Запада, а также западными социально-экономическими и политическими санкциями в связи с российско-украинским конфликтом. Показано, что современная социальная культура актуализировала особенности представления информации с применением цифрового формата и последующим декодированием, что повлияло на социальную динамику в целом. Социокультурный подход к современной манипуляции общественным сознанием базируется на анализе этносоциокультурного речевого поведения «цифровых аборигенов» в Интернете, демонстрируя обращение к иным способам манипуляции, чем у манипулем, нацеленных на «доцифровое поколение». *Вклад авторов.* М.Д. Лагуткина: разработка общей концепции исследования, обобщение полученных результатов; Чжан И: анализ китайских источников; Чанг Тхи Тху Хуонг: анализ вьетнамских источников.

Ключевые слова: медиадискурс, цифровой медиадискурс, пениафобия, манипуляция, страны Азиатско-Тихоокеанского региона, деструкция, психологическая война, информационная война.

Introduction

Humans seek to set the vector of clustering people, objects, and phenomena in the focus of moral and material values, stigmatizing some phenomena (such as diseases, poverty, injuries, wars, old age, orphanhood, etc.) and ascribing desirability and priority to other phenomena (for example, youth, health, wealth etc.), which in one way or another affects the assessment vectors of mass culture.

The purpose of this study is to identify the media representation of peniaphobia (fear of poverty) as a destructive socio-cultural phenomenon with the definition of its place in the process of cultural genesis in the Asia-Pacific countries, which forms the prerequisites for the further evolution of cultural theory and develop a holistic view on the functioning of the socio-cultural regulatory mechanism 'wealth – poverty' in the public consciousness from the standpoint of digital media discourse [Hu Jiadong, 2020; Tsvetkova, 2020].

Researchers suggest that polarization sets a dichotomy in society, allowing us to designate destruction as an indispensable tool for the development of human society [Borisova, 2007; Lysak, 2007; Chandrappa, Bhusan Das, 2021]. At the same time, scientists tend to neglect the fact that in terms of dystopian philosophy [Galieva, Fatkullina, 2013; Reprintsev, 2013; Vyselko, 2022], destruction is a socio-cultural and psycholinguistic marker of victimhood, eventually leading to the deviation of identity and destroying the foundations of personality and society.

The construction of an effective mechanism for expanding the 'language of hostility' through mass media reflected new socio-cultural realities that emerged immediately after the end of the First World War. The concept of hostility evolved throughout the periods of the Second World War and the Cold War in the information wars between the USSR and the USA, China and Japan, the USA and Vietnam, Russia and the West, China and the USA, etc. The 'language of hostility' has become the dominant provocative factor initiating the 'color revolutions' [Sundiev, Smirnov, 2016].

Destruction by itself is a complex socio-cultural phenomenon that exploits the concepts and values of the traditional worldview. We have to admit that some manifestations of destruction, such as the destruction of norms in society, were considered by researchers in the aspect of studying the problems of autoaggression and suicide, terrorism and extremism, drug addiction and gambling addiction [Karabulatova, Zhang, 2024]. As a rule, the destruction and problems of positive personality identity become the object of close attention of psychophysiologists and psychiatrists, geneticists and biologists, historians and sociologists, political scientists and lawyers, cultural scientists and linguists [Efremova, 2012; Koptseva, Seredkina, 2013; Magomedov, 2020; Pugachev, 2014; Troshin, 1999]. At the same time, manifestations of destruction are often associated with a broader understanding of the mechanism of the destruction of the norm [Karabulatova et al., 2021; Karabulatova, Kopnina, 2023; Ryabchenko et al., 2021; Sundiev, Smirnov, 2016; Troshin, 1999; Huong Thi Thu Chang, Baraboshkin, Nurgazina, 2023]. Today, the 'wealth – poverty' dichotomy is becoming more salient in the public consciousness since the wealth stratification is hypertrophied through the media, exacerbating the crisis phenomenon of the 'great gap' between the rich and the poor, manifested in the form of increased impact of information attacks of post-truth in covering issues of socio-economic and geopolitical stability in certain countries.

Materials and methods

We obtained the empirical research base by a continuous sampling method from Internet data of publicly available sources in the countries under study, and analyzed it using traditional scientific and analytical tools.

We extracted articles on peniaphobia from the following digital sources: *Russians.online*, *tjournal.ru*, *International Anti-Corruption Portal*, *Moskovsky Komsomolets*, *Vietnam News*, *Vietnam+*, *Fishki.net*, *Komsomolskaya Pravda*, *Lenta.ru*, *InoSMI*, *Coura.com*, *Regnum.ru*, *Zhenmin zhibao*, *Novaya Gazeta*, *Moskva24*, *EKD!*, *Xinhua News*. In total, we compiled and analyzed over 300 articles, published in Russian and English. The samples from the Russian texts, that are used in the article, were translated by M.D. Lagutkina.

The comparative analysis of peniaphobia is presented across modern mass media discourse of the Asia-Pacific countries (Vietnam, China and Russia) in relation to the concept 'wealth/poverty' that covers the topics of economics and finance, hunger and satiety.

For considering peniaphobia, we defined the period between 2011 and 2024 as in the early second decade of the 21st century, the phenomenon of interest received the focus of scientific attention [Zarubina, 2011]. The beginning of the third decade of the 21st century was marked by a sharp surge in media publications on financial well-being, poverty, hunger caused by the coronavirus pandemic, Western sanctions against Russia, etc. A large number of publications had a destructive 'linguatoxic' nature that confirmed the development of the concept of 'sociopsychic epidemic', introduced into cultural studies in 1999 by A.A. Troshin in the context of the general theory of social destruction [Troshin, 1999].

Methods of modern media and digital space research, methods of studying the formation and transformation of various forms of identity have become dominant in our work. First of all, these are studies of cultural practices by P. Bourdieu's [2013] theory of the social field, multimodal methodological approaches to the study of virtual mobile multiple identities [Karabulatova et al., 2021; Koptseva, Seredkina, 2013; Tatarko, 2014]. In the aspect of analyzing the processes of socio-cultural identification, we relied on research in the field of social identity, the methodology of which was developed by B. Anderson [2016], A. Appadurai [2021], V.N. Denisenko [Denisenko V.N., Denisenko A.V., Chebotareva, 2016], A. Goldstein [2021], V.I. Karasik [2021], E.N. Molodychenko [2017], and also on the

methods of sociology of culture by P.L. Berger and T. Luckmann [1995], P. Bourdieu [2013], T.M. Goncharova [2016], V.M. Korovin [2014], O.V. Popova [2018], N.N. Koshkarova and N.A. Ruzhentseva [2019], etc.

The empirical research uses humanitarian methods such as cultural analysis of survey data, psycholinguistic analysis of the user's behavior in social networks, analysis of comments on publications in the media, and analysis of social network profiles, with limited use of social psychological methods. It also uses linguistic methods to assess the polarization of opinions, critical discourse analysis, comparative analysis, interpretative and functional methods.

Results

The theme of peniaphobia is intensively exploited in the discourse of various ideological, geopolitical, socio-economic, historical and psycholinguistic opponents during wars, including psychological and informational ones. It primarily draws on the fear of poverty, which is intrinsic in the collective consciousness. Figure represents the associative word cloud of the concept of 'poverty' built according to opinion polls conducted on social networks among native speakers of the Russian language.

As we can see, closely related to 'poverty' and 'wealth' is the concept of 'destitution' that reflects a stark polarization in society. Remarkably, the geopolitical toponyms *Russia*, *Africa*, *India*, and *Harlem* appear linked to 'poverty', this is due to the role of media discourse in shaping opinions about the economic well-being of countries in modern world. We believe there is a destructive system of forcing negative civic and socio-cultural identity, contributing to the formation of migration sentiments among the population.

On the periphery of the associations, the word cloud comprises the concepts of *orphan, beggar*, *deadbeat*, *unworthy*, *bummers*, *Gastarbeiter*, *panhandlers*, *hobos*, *retired people*, *drunk*, *disorderly*, *bum*, *tramp*. These associates represent an image of social groups that are perceived as the poverty bearers in the public consciousness, acting in the mass media discourse as verbal markers of socio-cultural targets.

By *destructeme*, following I.S. Karabulatova and G.N. Kopnina [2023, p. 324], we understand a certain feature of the text intended by the author, which conveys the meaning of 'destruction', 'aggression', 'punishment', 'anger', and 'indignation', involving the information recipient in the dramatic conflict triangle 'victim – persecutor – deliverer' proposed by Karpman [Demidova, Soyko, 2017]. The following headlines are good examples of destructemes: *A famine of biblical proportions was predicted for mankind: what **awaits** Russia. The virus **will leave most people without food*** (Moskovsky Komsomolets, April 20, 2020); *It's not Russia's **fault**, but yours! Economist John Ross has revealed the true causes of the impending famine* (Tsargrad.tv, May 27, 2022) and others.

Based on this, the destructeme in the media discourse appears not just as a textual anomaly, but as a means of gentle formation of deviant behavior in the recipient, who is somehow involved in a conflict with subsequent inevitable retaliation.

The associative word cloud of the concept of 'poverty' in the Russian media space

In this regard, it is possible to assume that the 'destructeme' itself conveys the meaning of punishment/retribution, explicitly or implicitly. For example: *Several new apocalypse plots are being prepared for the world at once* (Vzglyad, May 28, 2022). It is no coincidence that destructive behavior causes retaliatory aggression, which is a repressive element of sociality, realized through media discourse, despite the obvious failure of such a communicative strategy. For example: *'On the second day, the **apocalypse** began'. **Protests** in Kazakhstan, **pogroms** and the **seizure** of the airport of Alma-Ata through the eyes of Russian eyewitnesses* (Lenta.ru, January 12, 2022).

The very dichotomy along the 'wealth – poverty' axis refers not only to the assessment of the economic state of the country but also to socio-political public attitudes since satisfaction with one's income level is strongly associated with a sense of comfort and well-being, a sense of happiness. According to the *World Happiness Report*, Finland ranks first in the world for the seventh year in a row, demonstrating a low level of corruption, high GDP per capita, guaranteed employment, confidence in the future, social benefits and support, and high life expectancy. At the same time, in 2023, compared to 2022, Russia dropped by two positions in the world ranking of happy countries and took 72nd place between Moldova and Bolivia (Khvostik, Kommersant, March 20, 2024).

When covering the topics of poverty, media use verbal aggression, which is salient during the periods of the coronavirus pandemic (2019–2022), the intra-Kazakh socio-economic conflict (January 2022), the Russian-European confrontation in Ukraine (starting in February 2022). It should be noted that scientists single out the emoticeme as an emotive part of the meaning of a word and/or a phrase (metaphor) [Karabulatova et al., 2023, pp. 819]. The emoticeme 'peniaphobia' in the texts of media discourse exploiting the fear of poverty is enhanced by fresh metaphors, such as *sounds of stomachs 'experiencing hunger', a blow to the pocket 'lowering the standard of living'*, etc.

Publications on these topics employ evaluative language that immediately draws attention. For example: *The **Hunger** Games: can humanity face **food shortages** due to COVID-19* (Moskva24, April 20, 2020); *It became known about **mass hunger** among children due to the pandemic* (Lenta.ru , July 28, 2020); *The world is waiting for a 'catastrophic famine', which has not happened since during the Second World War* (Komsomolskaya Pravda, May 21, 2022); ***Mass bankruptcy** of travel agencies and airlines begins in Vietnam: even Vietnam Airlines is going down* (All Vietnam news, June 18, 2021); ***Black Days**: The deadly coronavirus has hit the Chinese economy. Now the whole world **is under threat*** (Lenta.ru, February 06, 2020); *Shanghai is **on the verge of famine**: a new lockdown has led to **horrific consequences**. People **are forced to beg** from their neighbors* (Moskovsky Komsomolets, April 20, 2022), *'Save us!' Translation of an article blocked in China on **food problems** in closed Shanghai* (EKD, April 9, 2022), etc.

The peniaphobia discourse can also include the broadcasting of fakes and mendacious rumors that allegedly Russian soldiers are massively exporting Nutella chocolate paste and household appliances from the territory of Ukraine, forming peniaphobia in expressive images among the target audience. For example: *Ukraine: Help!!! Russia **is stealing** toilets and Nutella from me!* (Fishki.net , May 24, 2022).

At the same time, the media promotes the image of a strong China that has managed to overcome poverty and misery. For example: *How China managed **to completely overcome poverty*** (Regnum.ru, February 26, 2021); *The Chinese Miracle: the country that **defeated poverty*** (Komsomolskaya правда.KZ, February 05, 2021); *Xi Jinping solemnly declared: China has won a comprehensive victory in the fight against **poverty*** (Xinhua, February 25, 2021).

Simultaneously, the spread of rumors about the impending collapse of the entire financial system provokes the desire of the population to purchase the maximum possible stocks of products, etc. Among the popular queries on the Yandex network in May 2022 were the following: *buy all gaskets*, *buy all buckwheat*, *buy all sugar*, *buy everything in Turkey*, *they buy everything in pharmacies*, *the dollar will no longer grow*, *the euro will no longer be sold in Russia*, etc.

Peniaphobia belongs to the traditional culture of the East. As it is pointed out by various media outlets, every third working representative of Asian

countries is poor, which is explained by the high population density, high competitiveness in the professional environment, low standard of living, scarcity of choice in the implementation of life strategies (Forbes.kz, November 25, 2020). However, social reaction to the poverty itself is taken for granted due to the influence of the traditions of Eastern philosophy. In this regard, the fight against poverty in the countries of the Asia-Pacific region has led to a culture of overconsumption with a public demonstration of disregard for the excess of food and everyday objects. Such a challenge to the traditional principles of an environmentally friendly attitude to food is associated with the focus on creating shock content to increase the views of the publication. A demonstrative disregard for the results of labor could not but provoke counteraction measures from government agencies. In this regard, quite a lot of publications appeared that began to explain the reasons: *Eat or pay: why did they start **fining food waste** in China?* (ITAR-TASS, May 21, 2021), *China **imposes fines** for promoting **excessive consumption*** (Parliamentary Newspaper, May 5, 2021), *China has **defeated poverty.** What Russia can learn from it* (Komsomolskaya Pravda, February 25, 2021). To some extent, the attitude towards poverty in China echoes the interpretation of poverty in Vietnam: ***Poor, but not beggars***: *how ordinary Vietnamese live today. Part II* (KFund.Media.com, March 27, 2018).

The psycholinguistic markers of peniaphobia in media discourse are:

1) **'talking' names** (such as: *Plyushkin, Mr. Ebenezer Scrooge, Monsieur Harpagon, The Miserly Knight*), which acquire the properties of a new evaluative nominalization when identifying competitors: *'Dump in the yard of the house': Tulyaks complain about **'Plyushkin'** from Decembrist Street* (Tulapressa.ru, January 21, 2024);

2) **phrases with the preposition** *for* (or using the expression 'in support') in combination with the subsequent denial of something/someone: ***For** economic freedom – against arbitrariness!* (Russians online, June 16, 2021); *'Nationalists' – **for** the economic revolution* (Exclusive.kz, January 20, 2023); *The collection of donations **for** the poor and hungry in Dagestan started on Ramadan* (Mirmol.ru, March 3, 2023);

3) **any calls that actualize the danger**: *You can **lose** everything! Why is it **dangerous to open** foreign Visa and Mastercard cards remotely* (Magadanmedia.ru, August 21, 2022);

4) **negative evaluative vocabulary**: *Moscow has been preparing for life in a **besieged fortress** for the last 8 years; Western sanctions against Russia are already **hitting** Kazakhstan* (Karavan.kz, July 3, 2022); *Analysts are confident that this case points to Rampant **corruption** in Vietnam* (International Anti-Corruption Portal, October 9, 2017); ***Foodsharing** in Russian: how did we get to the point where pensioners are looking for food in **the trash**? Late-term meals are an integral part of the lives of many **older people**. Russian pensioners collect food in **garbage cans** installed near grocery stores, where expired products are taken out* (Sevastopol.su, November 11, 2021); ***Poor pensioners** collect decommissioned products in **garbage cans** at stores, this is a breakthrough of the government to the bottom. It is impossible to watch without **tears and heartache** when old people rummage through **garbage cans for food**!* (Kprf-kchr.ru, October 20, 2020).

According to Thomas-Kilman's psychometric typology [Kardashina, Shangina, 2016], the idea of destruction in these strategies is constructed by accentuating conflict communication: *Tokayev commented on 'Moscow's **plans to take away** the northern regions of Kazakhstan'* (Kazpravda, February 18, 2022); *Putin again mentioned '**generous territorial gifts'** to Russia* (Tengrinews.kz, March 19, 2021).

The typology of speech and behavioral strategies in conflict, developed in the early 1970s by Ralph G. Kilmann and Kenneth W. Thomas, became the basis of a psychometric methodology for measuring the severity of the five main types of behavior in interpersonal conflict according to parameters such as rivalry, cooperation, compromise, avoidance and adaptation [Kilmann, Thomas, 1977]. Some researchers have stated that the Thomas-Kilmann questionnaire is not an effective tool. However, the coordinate system proposed by Thomas and Kilmann actively works to weaken the psycho-emotional sphere of the recipient through 'grade fluctuations' actively works to strengthen destructive elements in the minds of the target audience [Kardashina, Shangina, 2016].

The analysis of peniaphobic content allowed us to identify several target groups of the population.

1. The unemployed, i.e. those who have lost their jobs. Having lost a stable income, people are afraid of losing their last savings. They physically feel the approach of disaster, impending financial insolvency. The premonition of poverty destroys the personality, deprives the will.

2. Sudden bankrupts, like those who once used to be rich but lost their entire fortune. Having unsuccessfully invested the capital, they are left without means of livelihood. Although they managed to overcome a difficult situation, thoughts of regaining wealth haunt them constantly. For wealthy people, the loss of money and social status is the end of everything. If you are poor, it means that you have not managed to achieve the life goal, your existence is in vain and aimless. And in times of economic crisis, these fears are amplified.

3. People, who don't want to reiterate the fate of their parents and memories of a difficult childhood make them hoard and unwilling to spend too much. They have the following preconceptions: It's good when you know the value of money. It's worse if their role is overestimated. Why are poor young students happy, and wealthy mature people often lose their taste for life? When eternity is ahead, any fears are blunted. And if you have lived most of your life, you realize that having lost everything, you will no longer have time to start from scratch.

4. Socially vulnerable groups of the population living on government subsidies, realizing that they can lose even that little they have.

Addressing these groups, media reinforce latent fears in the perception of media content associated with the theme of peniaphobia.

Discussion

Most of the works on the analysis of destruction and manipulation of public consciousness are based on an interdisciplinary basis [Duskaeva, 2017; Kopnina, 2020], and the language of hostility and hatred has got the status of a global linguocultural phenomenon [Golev, Obelyunas, 2014]. At the same time, hate speech with labels against opponents is on the rise in mass media discourse. These phenomena are actively promoted as the communicative strategies for the management of the 'color revolutions' in the geopolitical space of ideological opponents from the West [Yakunin, Baghdasaryan, Sulakshin, 2009], discharging toxicity in the public consciousness [Skovorodnikov, Kopnina, 2017].

As N.V. Koltsova and N.L. Chulkina [2018] pointed out that Russian and Chinese respondents in their assessments of wealth and poverty are guided by background knowledge embedded in their culture, believing that the topic 'wealth-poverty' has increased conflict in society, causing contradictory assessments. The researchers believe that the topic of peniaphobia is more painful for Russian respondents than for Chinese respondents. However, we believe that this statement is hardly justified since the surveys were conducted by an interviewer who was not included in Chinese society, so the estimates cannot be relevant. Our point of view is supported by publications by Chinese researchers and bloggers about the impossibility of getting married in the absence of their own housing and expensive gifts to the bride and her family from the groom (for example, a car – for agreeing to meet and negotiate the wedding), in connection with which the topic of poverty eradication has become a key for Chinese policy [Mei Chunkai, 2021]. The Vietnamese leadership is making similar efforts [Ibragimova, Nguyen Thi Shao Li, 2015] since *Poverty leads the problems of Vietnamese citizens: PAPI report for 2019* (Vietnews.ru , April 24, 2020).

Chinese traditional culture evaluates wealth not from the point of view of the amount of money but from the position of food abundance. This point is confirmed in Chinese folk proverbs (rendered by Chang Thi Thu Huong): *A pile of gold is not worth a pile of grain*; *Rather than accumulate gold, it is better to accumulate grain.* As a rule, the poor man has high moral qualities in the national picture of the world: *Rice straw means a lot of smoke*; *a poor man – a lot of courage.* In contrast to the image of the poor man, the rich man is portrayed as cowardly, greedy, and dishonest: *The rich man does not care about honor*; *The rich man has a fierce heart*; *A miser has no friends*; *A rich man has a short memory*; *A lover of wealth does not care about honor.*

The 'polarization' of assessments of wealth and poverty is manifested in the proverbs: *The rich*

live at the expense of the poor, the poor – at the expense of their work; *The rich do not know the difficulties of the poor, the well-fed – the torments of the hungry* (the Russian version of *The well-fed does not understand the hungry*); *Poverty cannot be covered, you can't hide wealth*; *Poor – so don't cheat, rich – so don't get conceited*; *Poverty is not a vice*; *Phú quý sinh lễ nghĩa* (Eng. *Wealth breeds ceremony*) [Tsertsvadze, 2017; Chan Thi Thu Huong, 2021; Mysenko, 2011; Timchenko, 2013].

The Asia-Pacific countries have reduced the severity of the poverty problem but, at the same time, new socio-political challenges have emerged with a high degree of conflict in society due to socio-economic inequality manifested in income differentiation, consumption, gender imbalance, on education levels and regional specifics.

The topics of providing food, water, housing, work, money are vital for the population of any country, therefore peniaphobia (the fear of poverty) is actively exploited to whip up destructive moods in society [Shubaeva, Naumov, 2017] during the period of psychological and information wars, that use the so-called 'black information' [Gorina, 2020], or 'black PR' [Podpyatnikova, 2011] techniques.

It should be noted European and Russian media printed in Russian adopt a more categorical stance than Vietnamese or Chinese media outlets, which is due to the predominance of the policy of 'soft power' in the countries of the East and Asia that enables them to use euphemisms [Lagutkina, Karabulatova 2021]. In turn, the policy of 'soft power' is based on the peculiarities of the Eastern mentality [Koltsova, Chulkina, 2018] and the principle of 'keeping a face' in the cultures of the peoples of the Asia-Pacific region [Prosekov, 2020]. Destructive communication, exploiting the theme of peniaphobia in society, as a rule, is aimed at discrediting competitors (both inside and outside the country, including the country itself in a geopolitical context) and creating their pronounced negative image in a potential recipient.

Conclusion

Thus, peniaphobia is becoming one of the primary themes in modern information and psychological warfare, appealing to the human basic needs and values.

Media escalation of the peniaphobia theme in the context of isolation and self-isolation measures during the pandemic was an important reason for the protest moods of 2020–2022. The severity of the COVID-19 coronavirus pandemic has become apparent in its impact on the economic well-being of ordinary people when many people lost their jobs or their incomes significantly decreased. The pandemic exposed social problems and the 'severe fatigue' of various social cohorts from the existing socio-political agenda, worsened under the influence of confrontation with Western countries against the background of the Russian-Ukrainian conflict and the increased work of military propaganda tools.

Peniaphobia is promoted in the media of the Asia-Pacific region by exploiting the 'wealth – poverty' dichotomy evoking associations with the inner world, knowledge and experience. The theme of peniaphobia is spread through:

1) social networks (open and closed groups broadcasting various types of intimidation of the population on the topic of income reduction, financial crisis, price collapse (*buckwheat costs 200 rubles!*) and involving people to read content about potential high income, financial pyramids on crypto currency (Finico); forums of business consultants, business coaches, etc. (as a tool for spreading information that promises to 'get rich soon', about the upcoming surge in the dollar exchange rate, profitable investments, profitable fraud schemes via the Internet, the *Darknet* is used – a network of resources that supports the anonymity of its users, telegram channels);

2) media outlets that publish texts and comments on signs of an impending economic crisis, rapidly depreciating money, rising inflation, and huge incomes of the officials. These topics are deliberately exaggerated in the media outlets controlled by geopolitical opponents.

Manipulative techniques with the fear of poverty target the three levels of personality: a) the physiological level (the life, health and material well-being of the recipient involved in the discourse); b) the socio-evolutionary level (discussion of the problem of unfair income distribution, raising issues of worldview and political views); c) the pragmatic level, for example, the growth of institutions that promote financial literacy.

Background knowledge about wealth and poverty in the cultures of the Asia-Pacific

countries uses a psychoprotective mechanism of adaptation to socio-economic injustice, defining wealth not as a vital value but as a means of achieving well-being. The fear of poverty also affects relationships with other people, including those close to them, increasing social isolation that may lead to psychopathological states (excessive suspicion, greed, emotional coldness, etc.) and might require specialized medical care and correction.

NOTES

[1] The article is based on a joint report presented at the 1st international scientific conference "Digital Humanities at the present stage: experience, problems, prospects" (June 14–16, 2024, Harbin, Heilongjiang University).

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Миссия журнала «Вестник Волгоградского государственного университета. Серия 2. Языкознание» состоит в содействии развитию лингвистики посредством создания платформы для научной коммуникации представителей международного профессионального сообщества, открывающей широкому кругу читателей свободный доступ к достижениям национальных лингвистических школ и направлений.

Редакционная политика журнала направлена на решение следующих задач:

– комплексное представление достижений современной лингвистики посредством публикации результатов оригинальных исследований в области теории языка, прикладной и сравнительно-сопоставительной лингвистики, истории и современного состояния языков разных групп и семей; объединения в рамках одного номера статей схожей проблематики, авторы которых принадлежат разным научным школам, актуализируют традиционные и реализуют современные направления лингвистики, апробируют новые методы и концепции изучения языков, их функционирования в разных сферах (в том числе в интернет-коммуникации) и в разные периоды развития;

– поддержка исследований междисциплинарного характера в области компьютерной лингвистики, юридической лингвистики, социолингвистики, гендерной лингвистики, переводоведения, теолингвистики и др.;

– расширение международной аудитории журнала посредством привлечения к сотрудничеству зарубежных авторов, публикации на русском и английском языках научных обзоров современных теоретических и экспериментальных исследований, выполненных российскими и зарубежными учеными;

– повышение интереса зарубежных специалистов к российским исследованиям посредством перевода на английский язык русскоязычных статей, посвященных изучению славянских языков, в частности русского, и межкультурной коммуникации;

– поддержка интернациональных научных коллективов, объединенных сравнительно-сопоставительным изучением языков в рамках конкретных тем.

В качестве критериев отбора статей учитываются: обращение авторов к новым языковым явлениям и новым источникам, знание и использование авторами новейших отечественных и иностранных публикаций по теме исследования, научная объективность и качественный анализ фактов с применением соответствующих современному уровню развития методологии и методов научного исследования, дискуссионность. Поддерживая развитие научного взаимодействия, редакция приветствует статьи, написанные в соавторстве российскими и зарубежными исследователями в рамках международных проектов.

The mission of the *Science Journal of Volgograd State University. Linguistics* is to promote the development of linguistics by providing a platform for scientific communication between Russian linguists and the international scholarly community. The journal gives open access to the achievements of national schools of linguistics to a broad readership.

The editorial policy of the journal is aimed at achieving the objectives set:

– comprehensive presentation of the achievements of modern linguistics through publishing the results of original research in language theory, applied and comparative linguistics, history, and the current state of languages of different groups and families; bringing together in a single issue articles on similar research topics conducted by authors belonging to different schools of thought, publishing manuscripts using traditional and contemporary trends in linguistics, and applying new methods, research designs, and concepts to investigate linguistic phenomena and functions of languages in different discourse domains (including Internet communication) in synchronic and diachronic perspectives;

– supporting interdisciplinary research in the fields of computational linguistics, legal linguistics, sociolinguistics, gender linguistics, translation studies, theolinguistics, etc.;

– expanding the journal's international readership by publishing high-quality manuscripts by foreign authors and reviews of current theoretical and experimental research carried out by Russian and foreign scientists in Russian and English;

– enhancing interest in Russian studies on behalf of foreign professional linguists by translating into English Russian-language articles on the issues of Slavic languages, in particular Russian, and intercultural communication;

– supporting international research projects dedicated to the comparative study of languages within the framework of specific topics.

The criteria for selecting the articles to be published are the following: the authors' appeal to new linguistic phenomena and new sources, the authors' familiarity with latest publications on the research topic carried out by domestic and foreign scholars and application of their results, scientific objectivity and thorough analysis of facts using the methods of scientific research that correspond to the current level of methodology development, and actual discussion potential. The editorial board promotes the development of scientific cooperation and welcomes the articles written in co-authorship by Russian and foreign researchers in the framework of international projects.

УСЛОВИЯ И ПРАВИЛА ОПУБЛИКОВАНИЯ СТАТЕЙ В ЖУРНАЛЕ

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