Russian Journal of Communication

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rrjc20

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To cite this article: Svetlana Savchuk & Alexandra Makhova (2021) Multimodal Russian Corpus and its use in emotional studies, Russian Journal of Communication, 13:1, 42-61, DOI: 10.1080/19409419.2021.1887991

To link to this article: https://doi.org/10.1080/19409419.2021.1887991

Published online: 24 Feb 2021.

RUSSIAN JOURNAL OF COMMUNICATION
2021, VOL. 13, NO. 1, 42–61
https://doi.org/10.1080/19409419.2021.1887991

Routledge
Taylor & Francis Group

Multimodal Russian Corpus and its use in emotional studies

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ABSTRACT

The paper introduces the Multimodal Russian Corpus (MURCO) as a part of the Russian National Corpus (RNC). MURCO provides users with a great amount of linguistic information related to Russian. Moreover, the deeply annotated part of the MURCO contains data concerning Russian gesticulation, speech act system, types of vocal gestures and interjections in Russian, and so on. It should be noted that there is no specific annotation of emotions in MURCO, because it was initially designed as a tool for the linguistic research of different types of oral discourse. However, using various types of annotation, and relying on the correlation between emotions and corresponding language features, we can find a great number of emotional contexts for further study. This article describes the main types of annotation and the structure of the MURCO interface; and demonstrates various ways to extract the necessary information for emotional studies.

KEYWORDS

Multimodal Russian Corpus (MURCO); gesture annotation; speech act annotation; emotional expression; emotional communication

1. Introduction

Emotions and feelings are an object of research in various fields – psychology, culturology, philosophy, sociology, linguistics, cognitive science, neuroscience, computer science, etc. Each of them offers its own approach to studying these phenomena and the most effective of them are those that combine different methods.

Applied sciences have achieved impressive results in studying emotions, and they have been successfully implemented in HCI (Human Computer Interaction) applications. The majority of all new products in the field of emotional science are created using the studies of basic emotions and facial expressions (Ekman, 1993; Ekman & Friesen, 1978), but now researchers come to understand that these models are quite narrow and suggest new approaches. New models, firstly, consider both basic and mixed emotions and secondly, take into account information transferred through several channels – visual (facial expressions, gesticulation of hands and head, eye movement, body position, etc.), acoustic (including both verbal and non-verbal information) and others (Gunes & Pantic, 2010). The examples of such multimodal datasets dealing with the complex nature of the research object are EmoTV (Martin & Devillers, 2009), Emotion Miner Data Corpus (Fedotov et al., 2018), EmoReact (Nojavanasghari et al., 2016), and others.

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There is a new interdisciplinary branch of linguistic studies that has been recently established – the linguistics of emotions, or *emotiology* (Shahovsky, 2008). Researchers of emotions focus on describing the communicative nature of emotions, vocabularies of emotions in different languages and how they correlate, specific national cultural aspects of expressing emotions; linguistics and paralinguistics as two semiotic systems; sentiment and emotional tonality/modality of a text; affective semantic area of a language; affective semantic area of a linguistic persona (Alba-Juez & Larina, 2018).

There are several resources for studying emotions in the Russian language that are examined in Section 2 of this article. Then we give a detailed presentation of the Multimodal Russian Corpus (MURCO) which is a part of the Russian National Corpus (RNC). In Section 3, we describe its contents and the system of annotation, similar to the one used in other parts of the RNC. In Section 4, we look more thoroughly at the specific types of annotation, used in the Deeply Annotated part of MURCO (DA-MURCO). Section 5 shows how these types of annotation (gesticulation and speech acts) can be used when looking for contexts with emotional content. In Section 6, we show examples of searching for emotional contexts by linguistic features. In conclusion, we sum up the information and give an evaluation of MURCO's tools useful for emotional studies.

2. Related work

Nowadays there are a lot of databases designed for studying emotions. Some of them are open and grant access for academic purposes: OMG Emotion Dataset (Barros et al., 2018), AFEW-VA Database (Kossaifi et al., 2017), CONFER Database (Georgakis et al., 2016), etc. Large companies create platforms with data and tools for processing it, partially because crowdsourcing is now widely used for processing big data (Emotion Miner, EmotioNet challenge, etc.). Most of these resources are based on the English language. As numerous studies show, emotion in language has both universal and culturally specific characteristics (Apresjan, 2013; Krejdlin, 2001; Wierzbicka, 1999, etc.), hence studying emotions in the Russian culture must be based on the data of the Russian language.

In modern corpora of emotions there are two basic types of material – acted and naturalistic. Samples of acted material are collected with the help of special experiments. Informants, who might be professional actors or just ordinary people, are asked to enact different emotional states according to a certain scenario, or they are asked to observe the behaviour of real people (for example, in a TV program), and reproduce their facial expressions, bodily movements and emotions. Samples of naturalistic material are collected in everyday surroundings: informants are observed while communicating with other people and in different emotion-charged situations.

One of the corpora of the first type is The Russian Acted Multimodal Affective Set (RAMAS) created by Neurodata Lab. The participants were actors from the Russian State University of Cinematography, who recreated everyday situations. This dataset is a complex set of emotions people feel in every communicative situation. It contains a parallel recording of 12 channels: audio, video, eye-tracker, movement trackers, etc. RAMAS multimodal database is an open-access database that provides the research community with multimodal data of faces, speech, gestures and physiology interrelation (Perepelkina et al., 2018). Such material is useful for various investigations and automatic affective systems development.

The Russian Emotional Corpus (REC) belongs to the naturalistic type and contains video records of people in different situations, mostly stressful (Kotov & Budyanskaya, 2012). It currently consists of three subcorpora. The first one contains university students' oral exam answers – the kind of situation that is associated with negative emotions (agitation, fear, awkwardness, helplessness, shame, apathy, etc.). The second subcorpus includes people's conversations with an administration employee about utility bills. Such situations are either neutral or are also associated with negative emotions (annoyance, lack of understanding, confusion, anger, etc.). The third subcorpus named *Corpus of Happy People*, contains monologues of people talking about happy moments of their lives and reflects positive emotions. The REC consists of more than 800 videos which are annotated with the software called ELAN. The annotation has several layers: (1) interlocutors' speech and its pragmatic aspect, (2) facial expressions and eye movement, (3) gesticulation and hand movement, (4) communicative functions that attributes additional parameters to the basic annotation of the corpus. This functional annotation helps mark all hand, head and body movements which are specific for a certain function. There are 35 tags in the functional annotation: 'understanding, agreement, approval', 'denial, disagreement, objection', 'urge', 'drawing attention', 'showing lack of understanding', etc.

EmoChildRu corpus is another collection of natural material. It is the first child emotional speech corpus in Russian, which contains audio materials of 3–7-year-old children. The database includes over 20,000 recordings (approximately 30 h) collected from 100 children. Recordings were carried out in three controlled settings and documented the children's emotional states when they played with toys; repeated words after a toy-parrot in a game store setting; watched a cartoon and retold its plot. This corpus is designed to study the reflection of the emotional state in the characteristics of voice and speech and aims to study the formation of emotional states in ontogenesis. A portion of the corpus is annotated for three emotional states (discomfort, neutral, comfort). Additional data includes brain activity measurements, the results of the adult listeners' analysis of child speech, questionnaires, and description of dialogues (Lyakso et al., 2015).

Speaking about multimedia corpora we should also mention the project called *Stories about Dreams and Other Spoken Speech Corpora* (Kibrik, n.d.). It was designed to investigate spoken discourse and has no emotional annotation, but it can still be used to study emotional phenomena in spontaneous oral speech. First, it is helpful because of the specific content of the texts it contains. The project includes the corpora of the Russian spoken monologue speech: *Siberians' Life Stories*, *Funny Stories*, and a collection of corpora named *Stories about Presents and Skiing*. The chosen topics suggest that there are a lot of positive emotions expressed in the texts. Secondly, all these corpora might be helpful for studying emotions because of the detailed linguistic annotation they incorporate.

The biggest and the most diverse multimedia resource is the Multimodal Russian Corpus – a part of the Russian National Corpus which is described in the next section.

3. What is MURCO?

The Multimodal Russian Corpus (MURCO) is now one of the biggest open-access multimodal corpora in the world. It was created with Elena Grishina (1958–2016) as the supervisor in 2009–2010 and was first designed as a corpus of cinematic speech. Later it was

replenished with new content, such as samples of oral speech that belong to different spheres of communication.

In her works, Grishina described the objectives of creating MURCO, the methods of selecting content and the annotation system (Grishina, 2009a, 2009b, 2009c, 2010a, 2015, etc.) She also showed how using MURCO can help with studying the vocabulary and grammatical structures of spoken speech (Grishina, 2009d, 2010c, 2011). Grishina's major work on the system of Russian gesticulation (Grishina, 2017) is based on MURCO. Grishina (2010b) covers the prospects of using MURCO for studying emotions.

3.1. Content of MURCO

Today the total volume of MURCO is more than 4.5 million tokens. MURCO contains the following subcorpora:

1. The cinematic speech subcorpus consists of Soviet and Russian movies (3.4 million tokens).
2. The public speech subcorpus includes recordings of academic speech, TV and radio talk shows, documentaries (more than 1 mln tokens).
3. The non-public speech subcorpus contains samples of everyday communication (15,000 tokens).
4. The theatrical speech subcorpus contains recordings of theatrical performances on stage, and radio recordings (40,000 tokens).
5. The subcorpus of authorial and professional (dramatic) readings presents so-called written-to-be-spoken speech (more than 46,000 tokens).

Vocal speech in MURCO is presented as a number of audio and video files, divided into small fragments (clips) from 10 to 30 s each, with a corresponding snippet of the transcript. A clip and a text (or clixt, as E.A. Grishina referred to it) is usually a more or less complete communicative excerpt.

3.2. Annotation in MURCO

Each text is annotated according to MURCO standards and therefore has metatextual, morphological, semantic, accentological and sociological annotation that can be used as online search criteria. Moreover, it is possible to perform a search by the orthoepic structure or the vocal structure of a word. Video clips have a specific annotation of gestures and speech acts which we discuss in the next section.

There is no specific annotation of emotions in MURCO. However, human emotions are expressed externally through our facial expressions, gestures, intonation, word choice and syntactic constructions. That is why relying on different types of annotation presented in MURCO one can derive material for researching emotions.

4. What is deep annotation in MURCO

There is a subset in MURCO that is deeply annotated and now contains 6 movies. Each video clip has 2 types of annotation: (1) describing all facial expressions and gestures,

(2) describing all speech acts. Thus, the deeply annotated part of MURCO (that now contains 2500 clips) gives the possibility to search not only by linguistic features but also by non-verbal characteristics. Gesture and speech act annotation was done by E.A. Grishina with the use of specific software (Grishina, 2010a; Kudinov & Grishina, 2009).

4.1. Gesture annotation

Each gesture is supplied with a set of characteristics that can be divided into two groups. The first group is so called objective characteristics which describe a gesture in terms of active and passive organs (hands, palms, head), the positioning of a hand or a palm, the direction of a movement (upwards, downwards, forward, etc.). The second group comprises subjective characteristics – the type, the meaning and the name of a gesture. We call them subjective, because they are not attributed automatically, but by annotators.

The gesture annotation system now consists of 14 gesture types, comprising approximately 250 gesture meanings with about 400 gesture names. These names are the same as the set phrases used for denoting facial expressions and gestures in the Russian language (*to nod, to shake one's head, to cover one's face with one's hands, widening one's eyes, to look aside*, etc.).

Some of these gestures can express emotions – gestures of inner state and critical gestures (although gestures of other types can also be observed when a certain emotional state is being expressed). The full list of gestures with their meanings and examples can be found on the help tab of the search page (see Section 5.1).

Gesture annotation can help select gestures with specific characteristics, clips containing gestures of certain kinds and, possibly, expected emotional situations.

4.2. Speech act annotation

Speech act annotation in DA-MURCO (deeply annotated MURCO) is attributed to a whole utterance and consists of several characteristics:

- types of speech acts,
- types of repetitions (if there are any),
- manner of speaking,
- completeness/incompleteness of a speech act,
- types of vocal gestures and interjections.

4.2.1. Annotation of speech acts as such

There are 13 types of speech acts in the system: Appellatives, Interrogative, Imperative, Modal utterance or performative, Negation, Pejorative, Complimentary, Agreement, Negotiating, Assertion, Citation, Joke, Etiquette formula. Each of these types includes several meanings of speech acts. There are 150 such meanings in total. For example, Complimentary type includes such meanings as *compliment, approval, praise, boast, toast,* etc. Etiquette formulas include *expressing gratitude, excuse, ending conversation, congratulation, greeting, saying goodbye*, etc.

Most types of speech acts include both neutral and emotionally coloured ones. For example, there are neutral appellative speech acts (address, response to address, call to

action, password, etc.) and there are emotionally coloured appellative speech acts (endearment, criticism, ironic characterization, etc.). Some speech acts, such as etiquette formulas (greeting, saying goodbye, expressing gratitude, etc.) can be either neutral or highly emotional depending on the situation (see Section 5.2).

Annotating speech acts allows users to select clips containing certain speech acts regardless of their lexical or syntactic structure, and examine them in different communicative situations, both neutral and emotionally coloured.

4.2.2. Annotation of repetitions

Annotation of repetitions can mark the absence or the presence of repetition in a remark or a dialogue, and show what type of repetition it is (one-word or many-word, single or multiple, with/without intensifiers, imitation). Different types of repetitions in MURCO and their connection to the emotionality of an utterance are examined in (Grishina, 2010b).

4.2.3. Annotation of complete/incomplete speech acts

The completeness of speech acts can vary and is marked during the annotation process. They can be *interrupted*, *incomplete*, *continuing*, including *a gesture instead of a word*, etc. Speech acts can transform like this for a number of reasons, such as the speakers' different emotional states and their intensity (for example, agitation, embarrassment, indignation, etc.). That is why this annotation can be used for selecting certain research material.

4.2.4. Annotation of manner of speaking

This type of annotation marks different kinds of speakers' physical and psychological states (*speaking through tears, laughing, intimate voice, affected voice, choked voice, drunken voice*, etc.), the situation when the speaking occurs (*declamation, reciting/reading aloud, singing, dictation*, etc.), voice quality (*shout, whisper, muffled shout, ventriloquism*, etc.), types of emphasis (*parcellation, scansion*, etc.). All these characteristics of speech acts are also relevant to expressing emotions.

4.2.5. Annotation of vocal gestures and interjections

This kind of annotation marks non-verbal characteristics of speech acts. There are several groups of such characteristics: types of vocal gestures (*communicative, mocking sounds, pause fillings, snort, sniff, click one's tongue*, etc.), sounds accompanying physiological acts (*sigh, sob, gasp, yawn, cough, grunt, cry, groan, chuckle*, etc.). Interjections are also significant and are characterized according to their functions in speech acts: *pain, indignation, agitation, admiration, pity, mockery*, etc.

As is well known, interjections are a form of expressing emotional states; therefore, it is always possible to use the lexico-grammatical search to find certain contexts. It might seem unnecessary to consider them a separate group of speech act characteristics, but, as the research of vocal gestures and interjections has shown (see Grishina, 2009d, 2010c; Sharonov, 2008), they can have multiple meanings. Searching for the most common interjections (such as *oh, ah, oj, aj*) will lead to getting too many contexts and interjections with different meanings, which makes it difficult to separate neutral interjections from emotionally coloured ones. Meanwhile, annotation of interjections and vocal gestures based on their emotional meaning allows users to get more homogeneous

research material. However, if this material is not enough, there is the lexical search in MURCO that we will talk about in Section 6.

5. Searching for emotional contexts in deeply annotated MURCO

It is commonly accepted that non-verbal means of communication, intonation and voice modulation are the main means of expressing emotional content. That is why DA-MURCO, which includes searching by gestures, is an abundant source of emotional content associated with these gestures. There is a special interface designed to make the search more convenient.

On the MURCO search page (https://ruscorpora.ru/new/search-murco.html) there are two tabs – Speech Acts and Gestures – that are hidden by default (Figure 1).

5.1. How do I find a certain gesture?

To perform a search by a gesture, you should click the link, 'search'. You will see a list of gesture characteristics, ordered by their meaning. (1) First there are attributes related to a person performing a gesture (speaker's name, speaker's gender, character's gender, speaker's age, character's age). (2) Next, there are objective characteristics of a gesture, necessary for studying gesticulation: main organ, palm positioning, hand positioning, passive organ, adaptor, movement direction, repetition. (3) Subjective characteristics of a gesture: gesture name, type, meaning. (4) Finally, there is a group of additional characteristics: absence/presence of an extender, absence/presence of a spoiler, emotions, completeness, authenticity and accessories.

To find out what gestures are presented in MURCO, you should click the question mark in the line, Gestures. This will open a pop-up window with gesture meanings in alphabetical order; each meaning is accompanied by the corresponding gesture type and the list of all gestures in MURCO with this meaning.

To get more information on emotional content you can use the tabs, 'Type of gesture' or 'Meaning of gesture'. In the pop-up window, you can choose all the gestures of a certain type or just some of the meanings and click the 'search' button (Figure 2).

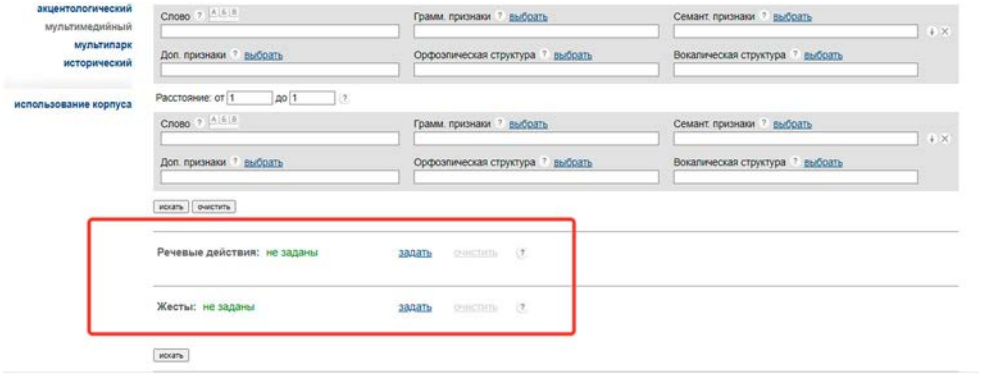

Figure 1. Speech acts and gestures tabs on MURCO search page.

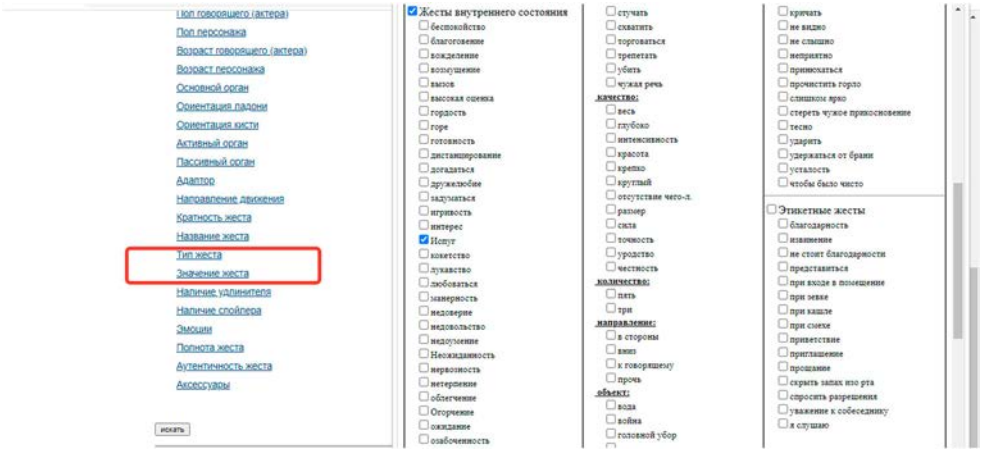

Figure 2. Pop-up window for choosing gestures of certain type or meaning.

Using the tab 'Name of gesture / Meaning of gesture', you can choose all the clips with certain gestures having the same name. In the pop-up window you can specify which meaning of the gesture you are planning to examine (for example, *making a helpless gesture with one's hands* can mean such inner states as *bewilderment, indignation or astonishment*) (Figure 3).

On the page with the search results, you will see a selection of video clips with the given gestures and corresponding text snippets of the transcript. Below each video, there is a list

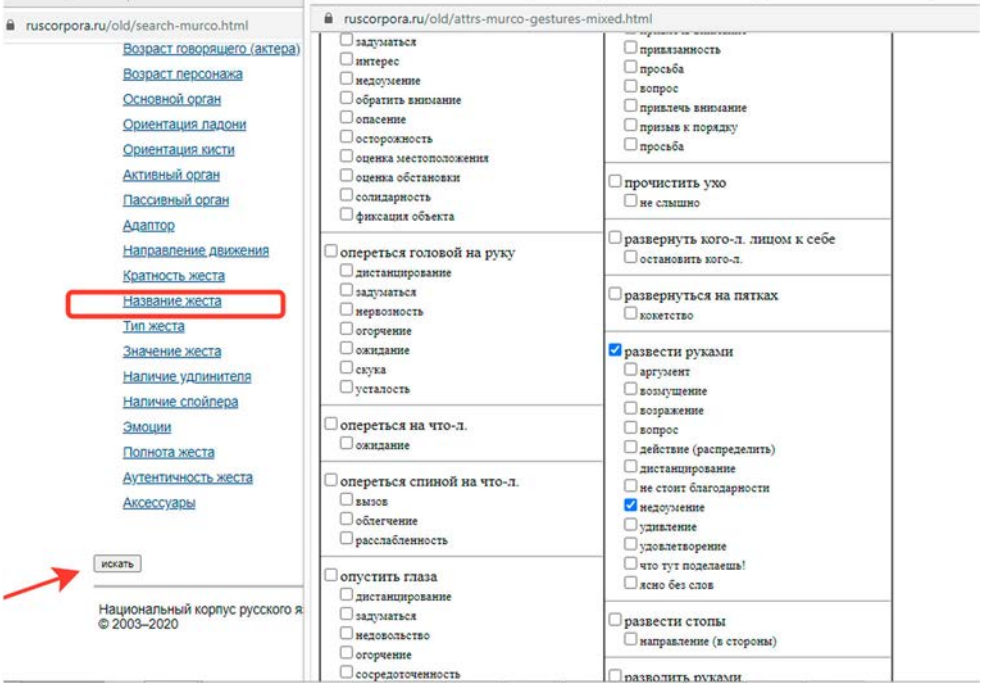

Figure 3. Pop-up window for choosing gestures by name.

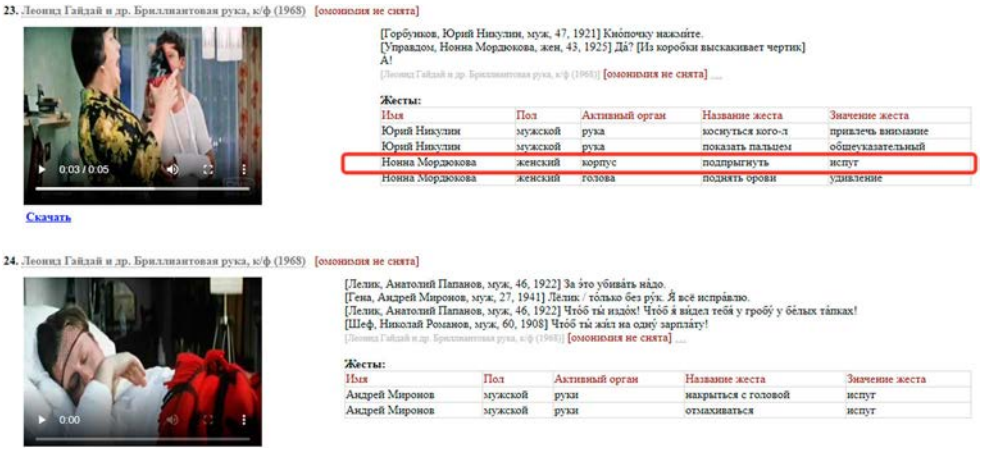

Figure 4. Results of searching gestures by their parameters.

of annotated gestures, and a table with the basic information about each gesture – performer, active organs, gesture name and its meaning. You can use this table to define which gestures from a given clip are annotated and how they have been interpreted. For instance, if you look for gestures with the meaning *fright*, you will get 54 clips as a result. Both video clips and texts are available for downloading (Figure 4).

Gesture annotation in MURCO gives researchers a possibility to examine emotions from different points of view. First, it is obvious that one emotion can be expressed differently in different situations through various facial expressions and gestures. Thus, according to the Corpus data, *fright* can be expressed with the following gestures: *eyes wide open (22 clips), jerk back (16 clips), shield with one's hand (8 clips), screw up one's face (8 clips), close one's eyes tight (6 clips), pull one's head into one's shoulders (6), jump up (5), raise one's eyebrows (3), cover one's mouth with one's hand (3)*, etc. On the other hand, it also becomes clear that one gesture can help express different emotions. For example, *flinging one's arms up* can mean *indignation, disappointment, astonishment, it-can't-be-helped*. Therefore, gesture annotation in MURCO can help study the differences between various ways of expressing emotions and examine the factors that influence selecting such ways, depending on the emotional situation. Besides, marking the gender, the age and the name of a gesture performer gives an opportunity to examine emotions from the sociological point of view and learn how people express emotions depending on their gender, age or individual preferences.

5.2. How do I find the required speech acts?

To find certain speech acts, you need to click the link, 'search' in the line, Speech acts (Figure 1) and open the list (Figure 5). Lines 1–4 characterize the sociological aspects of a situation: the number of speakers, their (or the actors') gender, the language they are speaking, and the kind of a situation they are in (giving a presentation in a meeting, a toast, a conversation with a doctor, a conversation with an official, etc.). Next comes the most important part of the list – speech act characteristics. The tab, Types of speech acts, shows 13 types of speech acts (*appellative, interrogative, imperative and*

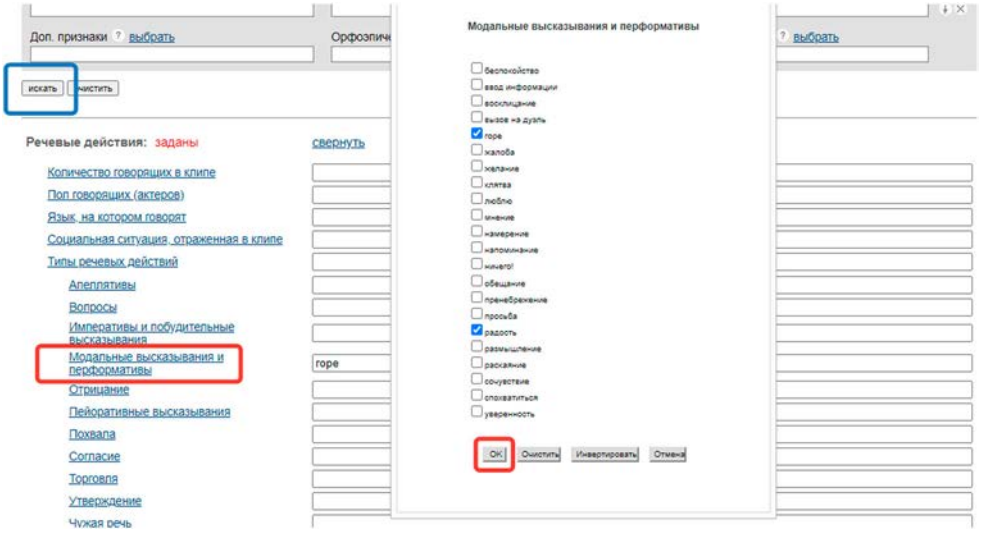

Figure 5. Pop-up window for choosing the type of speech acts.

hortative, pejorative, etc.). Below there are tabs that open the lists of all the corresponding speech acts. If you need to find out what speech acts are described in MURCO and what group they belong to, you need to click on the question mark next to the tab, Speech acts. In the pop-up window there is a full list of all the speech acts, divided into several groups.

When you open any of these tabs (for example, 'Modal utterances and performatives'), you will see a pop-up window with a list of corresponding speech acts. Among them there are a lot of speech acts related to expressing emotions (*grief, happiness, disdain, remorse*, etc.). You can choose one of such speech acts or a group of them (Figure 5).

The last on this list is a group of characteristics, *Completeness of a speech act*, *Repetitions and their types*, *Manner of speaking*, and *Types of vocal gestures and interjections* which allow the selection of clips with utterances of a certain level of completeness, containing different types of repetitions, manner of speaking and various vocal gestures and interjections. A user can select a required parameter and then mark a checkbox with a certain value (Figure 6).

After this, you should click OK and then – the search button on the main page (see Figure 5).

The search results include a number of clips with corresponding text snippets containing the required speech acts. Some video fragments can contain more than one speech act. Unlike gestures that are described in the table format, speech acts are not annotated and a user has to find them among selected fragments on their own. For example, the query *pejorative utterances* returns 451 video fragments with a great number of speech acts belonging to the pejorative type – reproach, critical comment, threat, cussing, etc. (including highly emotional situations).

(1) [In the car] [Lena/ Ekaterina Dronova] *Molchish'? Dazhe v Novyj God tebe nechego mne skazat'. Mozhet/xot' slovechko najdyosh' dlya menya?* (*You're not saying anything? Even at New Year you have nothing to say to me. Do you think you can find a word for me?*) [Aleksandr Rogozhkin. Operatsiya 'S novym godom'/ Operation Happy New Year (1996)]

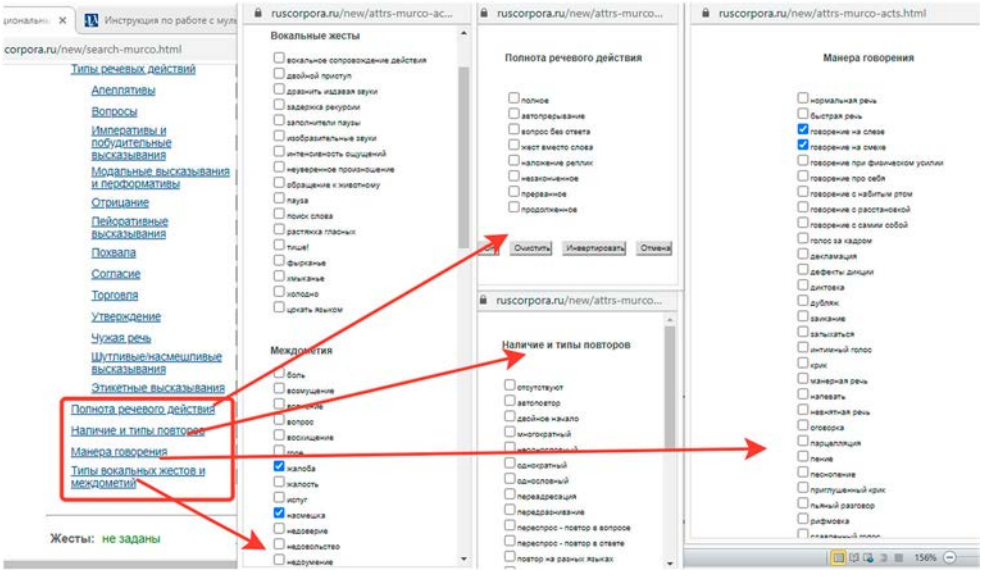

Figure 6. Pop-up window for choosing parameters of speech acts.

Reproaches in the affirmative and question form (pejorative question, belongs to Interrogative speech act type).

(2) [Lena/ Ekaterina Dronova] *A firma tvoya merzkaya zagnyotsya! Ya tya eshhyo v tyur'mu upeku! I voobshhe/ ya vas vsex po miru pushhu.* (*And your dirty company will be ruined! And I'm gonna put you in jail! And I'm gonna ruin you! All of you!*) [Aleksandr Rogozhkin. Operatsiya 'S novym godom'/ Operation Happy New Year (1996)]

In this case threats take the form of promises and warning, and are accompanied by shouting (belong to the 'Manner of speaking' speech act type). The emotions are expressed explicitly: E. Dronova's character uses lexical expressions (*merzkaya, v tiur'mu upeku, po miru puschu*) in combination of these with extralinguistic means (menacing tone, raised voice, and so on). Thus, searching speech acts allows a user to examine how different speech acts are used in different situations, what kind of verbal and gesture accompaniment they may have depending on the situation, the speakers' emotional state and other factors.

DA-MURCO contains more than 90 fragments with the speech act expressing gratitude, and the analysis of these fragments shows that in emotionally neutral situations gratitude is normally expressed with *Spasibo* accompanied by a nod or a handshake. If the speakers are close, they can express it with gestures only. In formal situations, along with *Spasibo*, *Spasibo za* + X_{acc}, *Blagodaryu* and *Blagodaryu vas* are used. In everyday speech such expressions may seem too formal, obsolete or ironic (they are mostly used in stylized archaic speech).

In emotional situations, a speech act expressing gratitude is charged with the emotions a speaker is feeling at that moment, which is expressed in vocabulary, prosody, facial expressions and gesticulation. Let us give some examples.

Gratitude + a positive emotion.

(3) [House manager/ Nonna Mordyukova] [Examines the box] *Kakaya prelest'. Kakaya prelest'! A chto u vas s rukoj/ vy govorite/ Semyon Semyonych?* (*That's really nice! Really nice! So what did you say happened with your arm?)*

[Gorbunkov/ Yurij Nikulin] *E'to vam. Suvenir*. (*That's for you. A souvenir.*)

[House manager/ Nonna Mordyukova] *Chto vy … **Spasibo. Spasibo**/ Semyon Semyonych.* (*What … Thank you. Thank you, Semyon Semyonovich*.) [Leonid Gajdaj et al. Brilliantovaya ruka/ The Diamond Arm (1968)].

N. Mordyukova's character is obviously content with the attention she's given. When expressing gratitude for the present, she repeats the word *spasibo*, calls the giver by his first name and patronymic and smiles. Her gesture – *move one's chin sideways* – means satisfaction.

(4) [Kuz'ma/ Yurij Nikulin] ***Spasibo**/ rebyat! Nu/ **spasibo***. (*Thanks, guys! Thanks a lot!*)

[Male voice] *Pozhalujsta*. (*You're welcome*.)

[Kuz'ma/ Yurij Nikulin] *Spasibo! Vyruchili. Pomnyat rabotu ruki-to. Nu/ bud' zdorov*. (*Thanks! You really helped me out. My hands still remember what to do. Take care!*)

[Man1] *Bud' zdorov*. (*Take care.*)

[Kuz'ma/ Yurij Nikulin] *Spasibo/ Lyon'. Poka*. (*Thanks, Lyonya! Bye*.) [Lev Kulidzhanov, Nikolaj Figurovskij. Kogda derev'ya byli bol'shimi/ When trees were tall (1961)]

Y. Nikulin's character is happy that he's been given credence, and his gratitude is expressed in a multiple repetition of the word *spasibo*, actively addressing his interlocutors, smiling and handshaking.

Gratitude + a negative emotion.

(5) [Gorbunkov/ Yurij Nikulin] *Smeshno/ da?* (*Isn't it funny?*)

[Upravdom/ Nonna Mordyukova] *Ochen'*. ***Spasibo***. (*Very funny. Thanks*.) [Leonid Gajdaj et al. Brilliantovaya ruka/ The Diamond Arm (1968)]

In this context (continuing the video in Example 3), N. Mordyukova's character is unhappy with the present (unlike Y. Nikulin's character), the toy has scared her, and she feels annoyed and offended. She gives the present back, and thanks the man coldly, turning away from him and smoothing her hair. The word *spasibo* here can be interpreted as *no, thank you*.

(6) [Kiryuxin/ Nikolaj Karachencov] [together with Tikhon examines the moving picture] ***Spasibo**/ konechno. Ty by e'to luchshe Benkendorfu podaril. Emu nuzhnee.* (*Thanks a lot. You'd better give it to Benckendorf. He needs it more.*) [Alla Surikova. Choknutye (1991)]

In this situation, N. Karachentsov's character looks at the present indifferently. He cannot share the giver's enthusiasm and basically rejects the present, although he formally expresses gratitude.

Examining gestures and speech acts in deeply annotated MURCO demonstrates different kinds of people's behaviour in various emotional situations and improves our understanding of how emotions can be verbally expressed. However, DA-MURCO is

only a small part of MURCO. To enrich the research material and study all kinds of emotional nuances, one needs to study the biggest part of MURCO which is not annotated. This can be done by examining linguistic items.

6. How do I find emotional contexts in MURCO?

The aim of studying emotions from the linguistic point of view is to find the correlation between an emotion and the corresponding language features. Using all the collected linguistic and stylistic data on the written and spoken speech, we can use it not only to examine emotional contexts in MURCO, but also to get more specific information on these linguistic items. In this section of the article, we will show the capabilities of the lexico-grammatical search in MURCO and present some of its results which demonstrate its importance for studies of emotions.

Our search is limited to the cinematic subcorpus, because cinema gives the widest choice of different real-life situations, and it is reasonable to assume that the variety of emotions displayed on the screen will be undoubtedly larger than in popular science shows or TV interviews. The cinematic subcorpus also compares favourably to the others because of its volume and access to video material. Let us examine some of the most common ways of emotion representation in Russian and use them in the search for emotionally charged contexts.

6.1. Interjections and vocal gestures

Interjections are used to directly express emotional reactions to the world. If you type an interjection in the field 'Word' (on the main search page), you will get a number of videos where characters react to different events with the given interjection. All you have to do is look through them and choose those you need. For example, the query 'oj-oj-oj' returns more than 170 contexts where different kinds of characters' emotions are expressed.

The first group of contexts shows negative emotions: in the corresponding videos the interjection 'oj-oj-oj' reflects pain, fright, fear, etc. For example, in the following clip (7), the female character is scared of an electric heater that has started to burn:

(7) [Timofeev (Aleksandr Adabash'yan)] *Tamara Vasil'evna* …

[Tamara (Lyudmila Gurchenko)] *Ah!* ***Oj-oj-oj!***

[Timofeev (Aleksandr Adabash'yan)] *Ne podhodite!* (*Don't come any closer!*)

[Tamara (Lyudmila Gurchenko)] *Da vy perezhgli! Ya boyus' toka!* (*You burned it out! I'm afraid of electric shock!*)

[Aleksandr Adabash'yan, Aleksandr Volodin, Nikita Mixalkov. Pyat vecherov/ Five nights (1979)]

The second group of contexts shows positive emotions: 'oj-oj-oj' reflects astonishment and joy. For example, in clip (8) M. Ul'yanov's character is surprised and happy because his guess has turned out to be correct.

(8) [He (Mikhail Ul'yanov)] *Chto ona segodnya govorila? Ya tebya zhdala/ ty b mog vernut'sya/ dni podschityvala/ tri tysyachi dnej. Nu neuzheli dokopalsya?* ***Oj-oj-oj!*** *(What did she say today? I*

was waiting for you/ you could come back/ I counted the days/three thousand days. Have I really got to the truth? Oj-oj-oj!) [Nikita Mixalkov, Ramiz Fataliev, Sof'ya Prokof'eva. Bez svidetelej/ Without Witness (1983)]

Among contexts with the interjection 'oj-oj-oj' many express irony or sarcasm, which is for some reason not captured by dictionaries. The interjection imitates a primary emotion (fear, astonishment, etc.), but in fact, denies it and thus mocks it.

(9) [Egor (Vasilij Shukshin)] *Nikem bol'she ne mogu byt' na e'toj zemle! Tol'ko vorom. (I can't be anybody else on this earth, but a thief.)*

[Lyuba (Lidiya Fedoseeva-Shukshina)] ***Oj-oj-oj!*** *Kakie my strashnye! Tol'ko nikto ne boitsya. (Oh, look how scary you are! Only no one is afraid.)* [Vasilij Shukshin. Kalina krasnaya/ The Red Snowball Tree (1973)]

A thorough and complex analysis of interjections allows us to determine new nuances of their meanings, describe intonational and gesticulation peculiarities and find correlations with different emotional states.

6.2. Naming emotions and feelings

Emotions can be expressed by means of expressive language – words that name emotional states: *to hate, to despise, to love, to adore, amazement, pleasure, sadness, pain, sad, sadly*, etc. As a predicate, such words directly express the emotions they name: *I hate, I love, I am sad, it's amazing, how horrible, I'm delighted*, etc. In this case, one needs to search for a specific morphological form to find emotional contexts. For example, searching for present tense first person singular of the verb *voskhischatsya* 'to admire' returns 9 clips. Six of them show situations where characters display sincere admiration and delight, which is reflected not only verbally, but also in their facial expressions and postures. The face of a person experiencing such emotions, is relaxed, s/he is smiling with the mouth slightly open and the eyes a little bit wider than usual. The person slightly moves forward, as if trying to get closer to the object of admiration (Figure 7).

(10) [Fairy (Varvara Myasnikova)] *Ty vse eshche ne mozhesh' privyknut' k tomu/ kak legko ya menyayus'? (You still can't get used to how easily I change?)*

[Cinderella (Yanina Zheimo)] *Ya* ***voskhishchayus'****! Ya tak lyublyu chudesa! (I am so delighted! I love miracles so much!)* [Evgenii Shvarts, Mikhail Shapiro, Nadezhda Kosheverova. Cinderella]

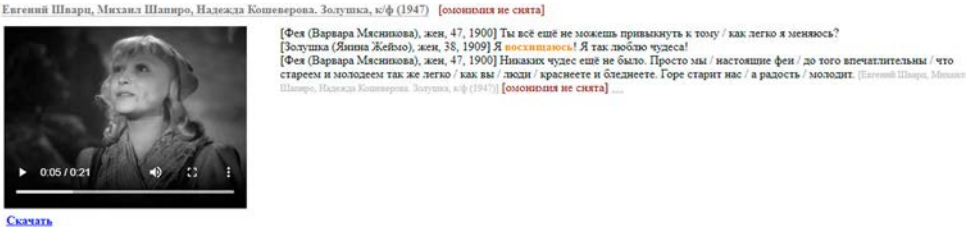

Figure 7. Lexico-grammatical search results.

In the three of nine clips mentioned above the phrase *Ya voskhischayus'* (*I admire/I'm delighted*) is used ironically. The character is torn between conflicting feelings. Ironical contexts demonstrate different intonation and gesticulation, if compared to direct ones. For example, in (11) M. Ul'yanov's character is shaking his head, as if saying no.

(11) [Charnota (Mikhail Ul'yanov)] *Smotryu ya na tebya/ Artur/ i* ***voskhishchayus'****. (I can't help admiring you, Arthur.)*

[Foreign woman] *Trois billets pour Buton s'il vous plaît.*

[Charnota (Mikhail Ul'yanov)] *Vot ty uzhe vo … vo frake. (You're already in a dress-suit.)*

[Foreign woman] *Merci.*

[Charnota (Mikhail Ul'yanov)] *Ne chelovek ty/ a igra prirody. Tarakanii tsar'. Nu i vezet tebe! (You're not a man, you're a freak of nature. Tsar of Cockroaches! You're so lucky!)* [Aleksandr Alov, Vladimir Naumov, Mikhail Bulgakov. Beg/The Flight (1971)]

There are other lexical items you can use to search for emotional contexts. Their variety is quite large, so is the variety of emotions they can express. It can be (1) rough, abusive language; (2) naming people using animal metaphors (*baran* 'sheep', *osel* 'donkey', *kuritsa* 'hen') and object metaphors (*pen'* 'stump', *tyufyak* 'mattress'); (3) words with suffixes expressing emotional evaluation (affectionate diminutive and pejorative augmentative); (4) axiological language (*umnitsa* 'smart cookie', *urod* 'freak'); (5) emotional intensifiers – particles, adverbs of degree, adjectives (*vot*, *tak*, *da*, *ochen'* 'very', *sil'no* 'strongly', *bezumno* 'madly', *neveroyatno* 'incredibly', *dikiy* 'wild', etc.) (Kolpakova, 2016). Using such lexical items to search by words, word forms or their combinations allows us to find contexts of various emotional content.

6.3. Syntactic tools

Emotional content can also be expressed by means of expressive syntax – repetitions, exclamations, parcellation, inverted word order, etc. Moreover, in the Russian language, as well as in some others, there are constructions or clichés – multiword combinations of language units whose semantics as a whole are not a compound of the meanings of each unit. Such constructions may also hold emotional information. For example, *Nu i nu! Vot eto da! Nu da! Ne mozhet byt'! Da ty chto! Ty smotri! Nu smotri (u menya),* etc. It is difficult to determine the meaning of these phrases, because it depends on the context and the situation. For instance, the phrase *Chto za* + X_{nom} can be used to express either a praise or disapproval. The phrase *Chto za pogoda!* (*What weather!*) can mean both 'good weather' and 'bad weather' depending on the situation (Grishina, 2010b).

Phrases can be found on the page with the lexico-grammatical search. For example, to find contexts with the phrase *Da chto ty (vy) … ,* the query should be built like this: first word – *da*; second word – *chto* + pronoun Nominative; third word – *ty* + pronoun Nominative or *vy* + pronoun Nominative. This will return 198 contexts for *ty* and 221 contexts for *vy*, each of them expressing a strong emotional reaction. The phrase *Da chto ty* + *verb* shows very strong annoyance or indignation and is accompanied by active gesticulation (12). If the phrase is followed by the verb *govorit'*, it may express mockery, incredulity or distrust.

(12) [Ganya /Aleksandr Lazarev-ml.] *Mamen'ka/ ya ved' tysyachu raz vas prosil! (Mamma, I have asked you a thousand times!)*

[Varvara Ivolgina, Mariya Kiseleva] ***Da chto ty*** *prosil? (What have you asked for?)* [Vladimir Bortko. Idiot (2003)]

Da chto ty (vy)! on its own expresses astonishment (13), objection (14), fright or mockery/irony (15).

(13) [Mokin /Leonid Bykov] *Tol'ko chto. I/ kak govoritsya/ s korablya na bal. (Just now. And/as they say/ down from a mall, straight to the ball)*

[Lena /Lyudmila Kasatkina] ***Da chto ty***! (*Oh, really!*) [Aleksandr Ivanovskij et al. Ukrotitel'nitsa tigrov/ Tiger Tamer (1954)]

(14) [Arina Dukel'skaya /Alena Babenko] *Prosti menya*. (*I am so sorry*).

[Igor' Dukel'skij /Aleksandr Baluev] *Nu chto … **da chto ty**/ eto ty menya … Che ya na tebya vse eto … Ne budem toropit'sya/ da?* (*You don't … You don't have to. You forgive me. Why did I make you … Let's not rush, shall we?*) [Aleksandr Kirienko et al. Indi (2007)]

(15) [Sergei /Konstantin Solov'yov] *Nichego. Da/ u nas byl mirnyi uzhin. (Nothing. Yes/we had a peaceful dinner.)*

[Dima /Igor' Zolotovitskij] ***Da chto ty***! (*Really?*)

[Sergei /Konstantin Solov'yov] *Da!* (*Yes!*) [Aleksandr Atanesyan, Il'ya Avramenko. Letnij dozhd'/ Summer Rain (2000)]

Studying the bank of constructions, their semantic and pragmatic aspects, is a high-potential trend in linguistics. The project called *Russian Constructicon* (Endresen et al., 2020), in which MURCO is being used for studying constructions in real-life spoken communication, must also be mentioned. For a similar description of *nu da*, see (Bychkova et al., 2019).

7. Discussion and conclusion

We have examined MURCO's capabilities as a tool for studying emotions. Although the corpus is designed for linguistic studies of oral speech, gesture and speech act annotation in its deeply annotated part provides us with the possibility to obtain required emotional contexts. The main part of MURCO gives even more material for research.

The peculiarity of cinematic material is that it heavily relies on montage cuts and editing. One scene shot with different cameras then becomes a single sequence of frames, which might be a problem for a researcher. An actor, who is currently speaking and gesticulating, is not necessarily present on screen: instead we can see his/her interlocutors and their reactions, or just a wide shot or a landscape. However, if we shoot an everyday situation or participate in it as observers, we are bound to encounter the same problems: focusing on one thing, we might lose something else, no matter if the camera is still, or moving with other participants (depending on the cameraman's choice). The entire picture can only be presented by shooting the situation with several cameras, which is only possible in a lab environment. Unfortunately, this kind of video material cannot be compared to the cinema, because it lacks naturalness and diversity.

Therefore, despite its flaws, cinematic material is widely used in building databases and datasets all over the world.

Another conclusion we can draw, having briefly analysed MURCO, is that the language phenomena, usually called irony, sarcasm, mockery, etc. are in fact very common. This poses a problem for both developers of automatic emotion recognition systems and specialists in sentiment analysis who admit that words with positive or negative affective evaluation can occur in the same contexts, and therefore it is difficult to distinguish between what they connote. This is the reason why there are projects whose aim is to design systems for irony or sarcasm detection in texts, and compile labelled corpora of sarcasm for training algorithms, and so on (Khodak et al., 2018). These various research purposes show that the field of emotion studies is to be investigated in greater depth, and the deeper we probe, the bigger challenges we face. Such corpora as MURCO can play a significant part in this researching process.

Further prospects of MURCO lie in a few directions. The first direction is enriching the database of texts belonging to non-public and public communication (TV records, public events, social activities, etc.). For example, records of political talk shows or YouTube videos that are already widely used in some emotion databases (EmoReact) can hold promise for studying emotions. The second direction is increasing DA-MURCO volume, annotating new movies as well as non-cinematic material. The third direction is developing new modules within MURCO and the Multimedia parallel corpus, which might give a lot of new material for comparative analysis of different aspects of spoken communication.

In conclusion, we need to mention that some results that the corpus returns to some search queries, have to be set aside as irrelevant (although they can still be used as sources of audio material). However, despite this disadvantage, the corpus gives access to extensive material, sufficient for conducting studies, testing and validating linguistic hypotheses and stimulating further research.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Russian Foundation for Basic Research (RFBR) [grant number 17-29-09154].

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