Intensity and its manifestations in speech and recurrent gestures in spontaneous dialogue

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Abstract

The present article explores the category of intensity in multimodal spontaneous dialogues in Russian. We regard intensity as a cognitive category expressed in notional, referential and sign meanings, i.e. in its manifestation degrees (high, medium, and low) and interaction of quantitative and qualitative meanings, referent types and types of lexical meaning. We study multimodal intensity patterns as revealed in the spontaneous dialogue in question, with the main focus on recurrent co-speech gestures, where the latter are attributed the stability of form and function. The research material consists of the recordings of about 3 hours featuring 20 participants, 1082 speech intensifiers, and 392 co-recurrent gestures of 9 groups. The results show, despite the susceptibility to individual preferences, that this is the notional meaning of intensity in speech that is more consistently revealed in recurrent gestures. The presenting recurrent gesture group appears to be most numerically frequent, nevertheless, these are enhancing and locating gestures that could help distinguish between pure quantity and merged quantity-quality cases. In general, exploring the use of gestures as mediated by intensity meanings allowed to specify their discourse functions attributed to intensity.

Keywords: intensity, multimodal behavior, recurrent gesture, speech, spontaneous dialogue
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Интенсивность и особенности ее реализации в речи и рекуррентных жестах в спонтанном диалоге

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Аннотация

В статье на материале русского спонтанного диалога исследуются особенности проявления интенсивности в мультимодальном поведении говорящего. Интенсивность рассматривается как когнитивная категория, которая в речи реализуется посредством понятийных, референциальных и знаковых характеристик, обладая разной степенью проявления (высокая, средняя и низкая), специфической особенностью сочетания качественности и количественности для референтов разного типа с учетом типов лексических значений маркирующих ее слов и выражений. В работе в спонтанном диалоге устанавливаются особенности ее мультимодальной реализации с опорой на рекуррентные жесты, демонстрирующие устойчивые паттерны формы и функции. Материалом исследования являются записи 20 участников общей продолжительностью около 3 часов, включающие 1082 интенсификатора и 392 сопровождающих их рекуррентных жеста в 9 группах. В ходе анализа определено, что, несмотря на индивидуальные различия, наиболее устойчивые мультимодальные паттерны устанавливаются в рамках понятийных значений категории. Наиболее частотная группа жестов — презентирующие, однако случаи количественного и количественно-качественного значений интенсификаторов разграничиваются в жестах усиления и местоположения. В целом, результаты уточняют функциональную роль рекуррентных жестов как определяемых характеристиками интенсивности в дискурсе.

Ключевые слова: интенсивность, мультимодальное поведение, рекуррентный жест, речь, спонтанный диалог

1   Introduction

Intensity has long been explored as a speech category, in Russian as well (e.g. [1; 2; 3]); it displays the semantics of quality and quantity and is interrelated with the categories of evaluation, gradation and emotivity. As known, intensity is considered within the frameworks related to emotivity studies, communicative and discursive studies, as well as to the studies in lexical semantics. Additionally, recent studies indicate that it can be manifested in other communicative modes, e.g., in gesture alone or in speech and gesture [4; 5; 6; 7; 8], which means that intensity can be viewed as a speech category, a gesture category, and as a cognitive category structuring both speech and gesture.

In this study, we address intensity as a cognitive category in speech and co-speech recurrent gestures known as "stabilized forms that embody a practical knowledge of dealing with different communicative, interactional, cognitive, and affective tasks" [9, p. 32]. Apart from being conventionalized and culturally shared, they "often work on the level of speech, fulfilling pragmatic functions" [10, p. 1558]. Meanwhile, little is known on how co-speech recurrent gestures shape intensity. The study identifies the regularities which appear in the speech and gesture distribution affected by different characteristics of intensity, such as its degree (high, medium, low), the distribution of its qualitative and quantitative meanings, the object of intensification.

2   Theoretical framework

2.1   Intensity and multimodality

In speech, intensity is commonly examined via its lexical and syntactic markers which can manifest either communicative or discursive meaning. While communicatives serve to express intensity within a speech act or in shaping emotivity, discursive markers serve to foreground the discursive functions of intensity [11]. Therefore, there are studies which explore intensity in expressing pragmaticity and emotivity [1; 12; 2; 3; 13; 14] and which explore its role in structuring discourse [15;16], as well as studies which develop an integral view onto its pragmatic and discursive use [17]. Importantly, intensity can be mediated by evaluation and gradality. In [18], M. Glovinskaya identifies three types of intensifying verbs considering their evaluative component: the ones always modulated by evaluation like *пялиться* (stare), *вырядиться* (be overdressed), non-modulated by evaluation like *наготовить* (еды) (cook all sorts of (food)), *силиться* (take pains), and allowing both depending on the situation like *навалить* (pile up) which can be used to express intensity only or intensity modulated by evaluation. Intensity is frequently explored in adjectives and adverbs as mediated by their gradality expressed in the degrees of comparison, but also in their lexical meaning displaying quality, quantity, evaluation [19]. Syntactically, intensity can be expressed in particles and pronouns where it is modulated by emotionality and foregrounding [20]. Therefore, intensity can be expressed in various linguistic means manifesting lexical, syntactic, pragmatic and discursive meaning and can additionally manifest emotivity and evaluation.

In attribution to gestures, there exist two distinct approaches to considering intensity, with the first approach treating intensity as a singularly gesture category, and the second viewing it as a category structuring both speech and gesture. The first approach explores intensity in gestures via their amplitude and spatial organization [7; 8]. For instance, intensity in gesture was found to modulate discourse efficiency in professional studies [7]. In [8] several singular features of gestures used to manifest emotional intensity were identified, gesture length, pressure and speed. In the second approach, intensity is considered within the framework of co-speech gestural behavior. For example, E. Grishina [4] examined the distribution of gestures with vocal interjection *Oh* (Russian О) and detected that pointing gestures were most frequent. The author also discussed the fist-configuration and its connection to intensity, especially some verbs with suffix -ану- (e.g. *рубануть*) in Russian which can be accompanied by such gestures due to their semantics and intensity that they possess [21]. S. Savchuk and A. Makhova [5] explored gestures mediated by the emotional contexts of different intensity and determined that one emotion can be expressed via different gestures, while one gesture type may relate different emotions. In [6] it was found that the distribution of representational gestures in L1 and L2 is overall mediated by emotional intensity, where fewer representational gestures were used to express intensity in L2.

These findings suggest that intensity can be explored as 1) a speech category, 2) a gesture category, and 3) as a category structuring both speech and gesture. The latter view implies that according to McNeill [22], it can modulate the communicative modes. In this paper, we consider intensity as a cognitive category which shapes the construal of discourse expressing a certain degree of quantity in manifesting the quality of discourse referents. To proceed, we adopt the view developed by O. Iriskhanova, who presumes that a cognitive category can be explored via its epistemic, ontological and semiotic aspects [23], i.e., via its notional, referential and sign meaning. The notional meaning of intensity is demonstrated in its degree of intensifying referents, their features, actions and states in discourse. The referential meaning relates to the type of referent intensified in discourse. The sign meaning describes the role of the intensifying component within the meaning of a word and in the gesture that displays it in discourse. Presumably, speech and gesture may both contribute to shaping intensity in discourse.

2.2 Recurrent gestures

Recurrent gestures bring specific aspects of discourse to attention accompanying negation, disfluency markers, interactional moves, etc., however, they are quite often detached from speech [24]. D. McNeill [25] explores the relationship between mental processes and social interactions through the lens of recurrent gestures. One of the significant findings is the concept of gesture-speech co-expressivity, which suggests that gestures and speech work together to convey meaning. A. Kendon was one of the first authors to describe the physical. i.e. formal aspect of hand gestures, identifying such forms as Open Hand Neutral Open Hand Prone, Open Hand Oblique, etc. with different palm orientation (i.e., away, up, down, vertical) [26]. C. Müller [27] identifies three key recurrent gestures: the Palm-Up-Open-Hand, Holding Away and Cyclic gesture, which highlight their position on a continuum from spontaneous to fully conventionalized expressions. In [28] ring, cyclic, palm up and down open hand, index finger and several others, specific form and movement parameters with a set of related functions are exemplified. H. Ladewig and J. Bressem [29] analyzed gestures using a systematic approach based on four parameters: hand shape, orientation, movement, and position in gesture space across the German speakers. The study revealed that the parameters of orientation, movement, and position showed similar patterns across individuals, which suggests that gestures are not merely individual improvisations but rather standardized forms that are consistently used within a cultural group.

Following this approach, we analyzed the recurrent gestures according to their form and movements, based on the image schemas that shape gestural physical properties. We distinguish seven major types of such schemas in gesture that accompanied the intensity markers in speech. These include presenting, outlining, locating, enacting, opposing, enhancing, away gestures. There are three categories, cyclic gestures, emblems and sway gestures, that were not put into any bigger categories and each presents its own group.

3   Experiment design

3.1   Participants and experiment procedure

The present study is carried out on the data collected within an experiment which recorded spontaneous dialogues between the native Russian speakers as they discussed in pairs a preset series of questions about AI. The corpus is 171 minutes long featuring 20 participants whose speech was recognised, transcribed and segmented by the automated transcription tool Whisper AI integrated into ELAN, and then further divided into elementary discourse units (EDUs) (the term was specifically developed by [30] for spoken discourse studies). Both speech and gesture of each participant were subjected to the analysis of stance-taking in speech including intensity coded Ev2 and form and movement patterns in gesture, where speech and gesture were annotated and categorised separately by two teams of researchers on different tiers in ELAN (Figure 1).
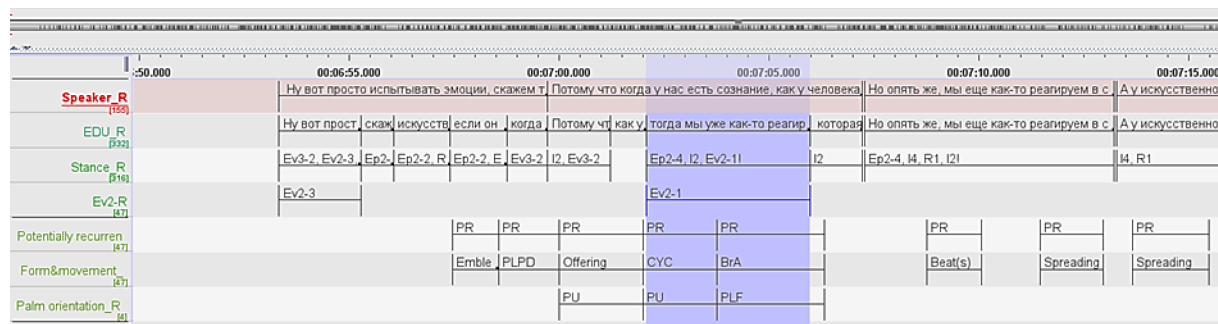

Figure 1: Fragment of analysis in ELAN with EDU *тогда мы уже как-то реагируем на там не знаю любое любую вещь* and two temporally co-occurring gestures highlighted

The data included 1083 cases of intensity (ranging from 29 to 115 cases per participant) accompanied by the total of 392 recurrent gestures (ranging from 5 to 42 gestures per participant) that were temporally aligned with the markers of intensity. Both markers and gestures could appear within one EDU as alone standing units or in clusters of 2-4 for speech or up to 2 in co-speech gestures. Though the speech analysis included putting speech into elementary discourse unit, the speech-gesture analysis was more precise due to the purposes of the current work. The analysis included only those gestures which co-occurred with intensity markers (as it was done in some works by E. Grishina, e.g. in [31]).

The data processing algorithm included 3 steps: frequency analysis of notional, referential and sign meanings in manifesting intensity in speech; frequency analysis of recurrent gestures used as co-speech gestures with the discursive markers of intensity; contingency analysis which allows to identify the regularities in the use of recurrent gestures with notional, referential and sign meanings of intensity.

4   Results and Discussion

4.1   Speech distribution in manifesting intensity

While addressing the notional meaning of intensity, following [1; 2; 3] we identified its two major notional features, namely, 1) degree of intensity and 2) degree of quantity and quality.

First, we assessed the degree of intensity, high, medium, and low intensity like in *в любом случае* (in any case), *достаточно* (enough), and *не очень хорошие* (not very good) respectively. The high degree cases proved to dominate in the corpus (694 cases – 64%). The examples often included highly expressive and emotionally charged lexical units covering reduplication cases (*большой-большой вопрос* – a big-big question) and exaggerations (*увидели там миллиарды люди* – it was seen by billions of people). The medium and low degree cases were scarcer, 152 (14%) and 237 (22%) cases respectively. The medium degree cases also included comparatives (*еще меньше процент даже* – the percentage is even lower), whereas the low degree cases included absolute negation and absence (*ни одного человека с планеты Земля не осталось* – there was no human being from Earth left). Second, we identified the pure quantity cases and those carrying the quantity meaning modified by qualitative features (merged quantity-quality cases). For instance, in *ну их много типа* (well there are many of them) we observe a

case of pure quantity, as *много* (many) is stylistically neutral and tells the interlocutor only about the number of objects. In *хотя бы будет симулировать какие-то эмоции искусственный интеллект* (AI will at least simulate some emotions) the intensifying marker *хотя бы* (at least) adds the attitude of annoyance to the meaning of small quantity. Being spontaneous by nature, the data proved to be rich in the 'emotional' samples of the second group (433, 40% of all intensity cases).

In exploring referential meaning, we presumed following [32] that the intensified referent can be related to either an object, a process (processes proper, actions, states and attitudes) or an attribute (stable and unstable). For instance, in *и ничто не может быть подобно человеку* (and nothing can be similar to a man) in *ничто* (nothing) the referent is of an object type. The use of a process can be exemplified in *просто находясь в атмосфере этой планеты* (simply while being in the atmosphere of this planet), where the marker *просто* (simply) modulates the use of a referent *находясь* (being) which is a state. In *хотя наверное это гораздо легче* (although this is much easier) the marker is *гораздо* (much), it shapes the referent expressed in an attribute *легче* (easier). In multiple cases we observe the presence of several referent types, e.g., in *но это не всегда правда* (this is not always the truth) the referent *truth* (правда) intensified by *не всегда* (not always) manifests both an object and a quality. In *и нет однозначного ответа* (there is no definite answer) the referent expressed in *ответ* (the answer) intensified by *однозначного* (definite) due to its morphological semantics expresses both an object and a process; additionally, the EDU intensifies the referent of an attribute type *однозначного* (definite). In major cases the intensified referents are of an attribute type (520 cases), object referents are less frequent (420 cases), the least frequent are processes (271 cases).

The sign meaning is manifested in direct or indirect meaning of intensity within a word. In the first case this is the main significative meaning of a word, e.g., in *единственный, любой* (only, every), in the second deals the intensifying meaning is connotational, e.g., in *прекрасно* (*прекрасно понимаю;* understand perfectly). Of special interest are the cases of using words or expressions with emotional connotations appearing in adjectives, verbs and nouns, e.g., *облажаться* (fail) for 'a very poor showing', *бредни* (nonsense) for 'unlikely information', *развлекаловка* (amusement) for 'something very frivolous', etc. The intensifying meaning is often implied in single words and in expressions in the context, e.g., in *кожаные мешки* (skin sacks) – which means 'merely humans', where *merely* is an intensifier. The number of cases of direct intensifying meaning is significantly higher (62% of all the examples considered).

4.2 Speech and gesture distribution in manifesting intensity

Next, we address the distribution of recurrent gestures. The first group, presenting gestures, include the hand movements that in their form have a resemblance of giving something to the interlocutor. The second group, outlining, includes gestures which in their movement contain the idea of shaping some idea or object. The third group, locating gestures, are used when the gesture movement is used to put some idea or object in space around the speaker. The fourth group, enacting gestures, include hand movements with the idea of doing an action with some object, e.g., as if cutting, hitting, clapping, grasping or tossing. The fifth group, opposing gestures, include gestures of binary relation, when a speaker repeats the same movement in two opposite planes, as if mirroring, weighing it. The sixth group, enhancing gestures, includes gestures that can be used to highlight some idea (precision grip, straight index held, fist, snapping one's fingers). The seventh group is away gestures, which have the idea of moving something away from the speaker, e.g., sweeping, brushing, throwing, keeping away and back and forth movement. Some gestures (sway, cyclic and emblematic) were left separate, as they do not form any groups nor fall under any of the above categories.

In Table 1 we present the distribution of gestures in the corpus.

	presenting	outlining	locating	enacting	opposing	enhancing	away	sway	cyclic	emblem	All
Total	945	278	286	237	115	225	118	29	173	66	2600
With intensity, abs (ratio)	129 (13.7)	58 (20.9)	34 (11.9)	40 (16.9)	17 (14.8)	41 (18.2)	32 (27.1)	4 (13.8)	23 (13.3)	14 (21.2)	392 (15.1)

Table 1: Distribution of recurrent gestures

With the total number of gestures equal to 2600, 329 gestures (15% out of the whole data set) co-occur with intensity cases in speech. The most frequent gestures are presenting, outlining, enhancing and enacting. Contingency tests showed the differences in the distribution of several gesture groups with and without intensity; these are away-gestures ($\chi2$=13.99, p<0.001) and outlining gestures ($\chi2$=8.14, p=0.005), which means that these gestures more often than not function as intensifying gestures. The results do not fully corroborate the results described in [4], where the prevalence of pointing gestures (classified as locating in this paper) with emotive words was found. Although locating gestures are rather frequent in our corpus, presenting gestures are 3.4 times more frequent. Meanwhile, the results comply with the findings in [6], which reported that representational gestures were frequent in expressing emotive intensity. Since in the present study representational gestures appear in the recurrent gestures of outlining, locating, enacting, away gestures, we can conclude that they constitute the major part of all the gestures used by the speakers.

One of the regularities found in the multimodal discourse under analysis is an almost identical distribution ratio of high, low and medium degree of intensity markers in speech and co-speech gestures of all types accompanying these markers at 64% vs 21% vs 14%. The same could be said about the distribution of 'merged quantity-quality' vs. 'pure quantity' cases (433 vs. 649 cases in speech and 151 vs. 241 cases in gestures), with their ratio of 40% vs. 60% for both, as well as for the distribution of indirect and direct lexical meanings in the sign meaning of intensity (about 40% vs. 60%). As for referential meaning, we observe 1211 cases, with objects constituting 35%, attributes constituting 43%, and processes constituting 22%. However, with 422 gestures used with different referents, 34% are used with objects, 24% with attributes and 41% with processes; therefore, we observe the redistribution of gestures used with attributes and processes.

4.3   Contingency and variance in multimodal manifestation of intensity

The gesture distribution with notional, referential and sign meaning of intensity is shown in Table 2.

	presenting	outlining	locating	enacting	opposing	enhancing	away	sway	cyclic	emblem	All
Intensity Degree											
high	75	37	20	28	9	24	25	2	18	12	250
medium	19	10	7	4	4	9	2	2	0	0	57
low	35	11	7	8	4	8	5	0	5	2	85
Quantity											
merged	53	26	7	16	5	22	12	1	6	3	151
pure	76	32	27	24	12	19	20	3	17	11	241
Referent											
object	42	24	14	14	7	11	16	3	10	4	145
attribute	33	12	6	13	9	11	9	0	9	0	102
process	55	26	16	18	7	23	13	2	6	9	175
Lexical meaning											
indirect	46	25	17	12	6	15	15	2	7	9	154
direct	83	33	17	28	12	26	17	2	16	5	238

Table 2: Distribution of recurrent gestures accompanying speech intensity markers

In terms of the differences between high and low intensity degree with gestures, we observed the tendency of presenting gestures to differentiate between them, with $\chi2$=3.59, p=0.059, which means low-intensity markers more commonly than high-intensity markers co-occur with presenting gestures. Chi-square test carried out on the cases of merged quantity and quality vs. cases of pure quantity demonstrated a significant contingency result for locating ($\chi2$=5.055) and enhancing ($\chi2$=4.431) gesture groups (p < 0.05). Therefore, the use of these gestures could serve to identify purely quantitative (Figure 2) or merged quantitative-qualitative meanings of intensity.

Figure 2: Placing down gesture. Locating gesture with a pure quantity case in EDU *что как раз таки больше всего как бы контроля и нет* (that there is exactly kinda no control more than anything)

The speaker, his hand protruded, places it down on the wording *больше всего* (more than anything), as if determining his choice and locating it in discourse. Nevertheless, the cases of locating stay rather scarce (34), with only 11% of all locating gestures accompanying intensifiers.

In exploring both referential and sign meaning contingency with gesture groups, we did not identify any differences in the use of referents with any gesture groups. Overall, the results show that only the notional meaning of intensity manifests several steady speech-and-gesture alignment patterns, whereas referential and sign meanings do not. The results are somewhat contingent with the ideas expressed in [1; 2; 3] which mostly addressed the degree of intensity and the degree of quantity and quality as its two major features. The results shown in Table 2 allowed to observe several regulations in the use of speech markers of intensity and gesture groups. As seen, presenting gestures are rather frequent, especially when dealing with high-degree, pure quantity, object and attributive referents, and direct meaning intensifying cases (Figure 3).

Figure 3: Presenting gesture, view from two angles: *и там будет все так вот по структуре* (it will all be structured like that)

As the speaker raises her hand up, as if measuring the whole scale bottom-up, the presenting gesture co-occurs with the word *всё* (all), which features the high degree of intensity, pure quantity, whereas the referent is an object. Figure 4 illustrates an away gesture, as this group demonstrated the highest co-occurrence with intensifiers (27%).

Figure 4: Away gesture: *что он не сл- не всл- не **слепо** должен идти и верить всему* – that he should not bl- blindly go and believe everything)

The participant moves the hand back and forth emphasising her negation by an aligned gesture and uses a high-degree intensifier in *слепо* (blindly). Away gestures most frequently accompany a high-degree-intensity, pure-quantity intensifier with direct meaning and its referent being an object.

Overall, the study supports the idea proposed in [25; 27], who attributed the use of recurrent gestures to embodying their social interactions through gestures. Specifically, the study confirms the effectiveness of classification suggested in [29] based on hand shape, orientation, movement, and position in gesture space. Applying it to exploring intensity in discourse helped reveal that this is the notional meaning of intensity which is displayed more systematically in gesture, which evidences of its functional priority in multimodal discourse. The results also contribute to the efficiency of adopting the tripartite view of a cognitive category with its epistemic, ontological and semiotic aspects [23] in exploring its multimodal expression.

5   Final remarks

The present study developed the idea of exploring intensity as a cognitive category expressed multimodally, in speech and co-speech recurrent gesture. The results, as mentioned above, were obtained based on the word-gesture analysis rather than EDU-gesture analysis to establish clear relations between the hand movement and the intensity marker. Adopting the view that a cognitive category is revealed in notional, referential and sign meanings, we hypothesized that the differences in these meanings could also appear in recurrent gestures based on hand shape, orientation, movement, and position in gesture space. The obtained results indicate high frequency of presenting gestures as such gestures can display various functions in comparison to other gesture groups and can be polysemantic due to their form and movement types. The away gestures were shown to be quite rare however they were used more often than expected and thus we can conclude that one of their prime functions could be to intensify the quality of the referent they are used with, especially since in many cases they perform the function of negation, thus highlighting the referent or adding the semantics of negation to it. The main outcome of the paper is that this is the notional meaning of intensity in speech which is more consistently revealed in co-speech recurrent gesture, while referential and sign meanings do not display rigid alignment with recurrent gestures.

Acknowledgements

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