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A Notional Level of Cognitive Distortions in Depression: Does It Exist? A Voice for Interdisciplinarity in Studying Cognitive Functioning of Individuals with Depressive Disorders

This aritcle raises the problem of cognitive depressive distortions observed at the notional level. It relates to recent neuropsychological, psychological, and linguistic studies, taking an interdisciplinary theoretical perspective, and illustrating the advantages of interdisciplinarity in modern psycholinguistic projects. It shows that, generally, the notional level has been neglected in psychopathological and psychological research on depressive functioning. The problem is described with reference to linguistic and psycholinguistic theories linking language with cognition. Particular emphasis is devoted to theories and methods of metaphorical processing analysis which, taking into account the similarities between cognitive functions engaged in understanding metaphors, and those disordered as a result of depression, seem to be an adequate frame to study the problem. The text ends with a proposal of an interdisciplinary research project dedicated to the study of metaphorical conceptualizations of some notions created by people suffering from depression.

Key words: cognitive representation of a notion, depression, interdisciplinarity, metaphorical conceptualizations, metaphorical processing, metaphors

Introduction

Is the meaning of *future* the same for two different people? Will *sadness* and *joy* be understood in the same manner by each participant of a given communicative situation? And finally: Will an "intensity of mood" variable increase individual differences in encoding semantics or – to be more precise – in creating cognitive representations of different notions?

The purpose of this article is to raise the problem of depressive cognitive distortions observed on the notional level. An interdisciplinary approach, as an attempt to combine psychopathology with psycholinguistic and linguistic theories, advocates the proposed theoretical perspective. The outcome of the latest neuropsychological, psychological, and linguistic studies, is taken into account. This paper should not be considered as an exhaustive presentation of the problem; it is rather thought to be an inspiration for future research and discussion.

Cognitive Distortions in Depression: A Well Analyzed and Verified Phenomenon

Beck's cognitive theory of depression (Beck, 1963, 1967) is thought to be one of the best known and empirically confirmed cognitive theories explaining the etiology of depression (cf. Solomon & Haaga, 2005). In the first place, it emphasizes abnormal, dysfunctional cognitive schemata observed in depressive individuals (e.g., taking the shape of predictions about self-helplessness and being unloved, cf. Beck, 1995), which are normally accompanied by the so-called *automatic negative thoughts* (concentrating mainly on three domains of experience: the self, the future, and the world; the so-called *cognitive triad*). However, it should be emphasized that Beck's theory concentrates mainly on cognitive disorders at the level of thought, not the notional one (overgeneralization and dichotomic thinking are examples of these cognitive distortions). Verbal (negative) stimuli are, in

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the first place, treated as attractors directing the attention of patients suffering from depression[1] (the so-called *content-specificity hypothesis*, Beck, 1976; see Lamberton & Oei, 2008, for empirical confirmation; for a review, see e.g., Gotlib & Neubauer, 2000); the existence of dysfunctional cognitive representations of separate notions is beyond the interest of the theory.

The perspective of psychological studies directs attention to cognitive functional disorders observed in depressive individuals. Memory deficits, concerning short-term (Dannenbaum et al., 1988, cited in Georgieff, Dominey, Michel, Marie-Cardine, & Dalery, 1998), as well as long-term memory (e.g., Cale, 1985; Sternberg & Jarvik, 1976; Watts et al., 1990, cited in Georgieff, Dominey, Michel, Marie-Cardine, & Dalery, 1998), are probably the most often cited deficits with a depressive basis[2]. Many publications provide empirical proof in favor of memory function disturbances in depression: working memory deficits (Fossati, Amar, Raoux, Ergis, & Allilaire, 1999; von Hecker & Sędek, 1999), poorer verbal learning (Castaneda, Suvisaari, Marttunen, Perälä, & Saarni, 2008; Smith, Muir, & Blackwood, 2006), decreased specificity of autobiographical memory (which is manifested by difficulties in giving a specific personal memory in answer to a key-word; so-called *overgeneral autobiographical memory*, see e.g., Raes, Wiliams, & Hermans, 2009; Williams & Broadbent, 1986, as cited in McNally, 2006), the influence of mood on cognitive styles in memory tasks (Erk et al., 2003, cited in Walter, Kiefer, & Erk, 2003), and inhibition deficits (Joormann, Krejtz, & Sędek, 2006). Depressive memory disorders are explained in several ways, for instance as a result of difficulties with effort-demanding processes, evoked by depression (see e.g., Danion et al., 1991, cited in Georgieff et al., 1998). The performance of memory tasks (particularly those demanding reverting to concrete, limited-time episodes from the past) is even treated as a predictor of troubles with overcoming depression (see Brittlebank et al., 1993, cited in McNally, 2006). Apart from memory deficits, the following cognitive disturbances are indicated as typical for depression in current publications: attentional deficits (see e.g., Mahurin, Velligan, Hazleton, Davis, Eckert, & Miller, 2006; Smith et al., 2006) resulting, amongst others, in problems with control- and concentration-demanding processes (for a review, see Georgieff et al., 1998), and decreased speed of information processing (*depressive retardation*), which is thought to have most influence on all domains of cognitive functioning of people suffering from depression (Sheline, Barch, Garcia, Gersing, Pieper, et al., 2006).

[1] Nonverbal stimuli may serve as such attractors as well.
[2] Compare cognitive deficits observed in other anxiety disorders, for example in PTSD (for a review, see e.g., McNally, 2006).

Postulate of Taking into Account the Notional Level of Depressive Disorders

The purpose of this article is to draw attention to the notional level of cognitive disturbances accompanying depression. This question is very rarely raised in the modern literature, which concentrates mainly on verification of psychopathological theories, on neuropsychological etiology of depressive disorders, or on cognitive functional disturbances. Indeed, recently there have been some doubts concerning the significance of research over notions for cognitive science (e.g., Xu, 2007). Nevertheless – as far as I know – there are very few studies on creating cognitive representations of separate notions by individuals with different mental disorders (research concerning disturbances in the process of interpretation of verbal stimuli in groups of people with PTSD is encountered most often, cf. e.g., McNally, 2006).

There are at least three reasons for raising the question of the notional level of depressive cognitive distortions. Firstly, it will enlarge the area of research problems discussed in recent publications; secondly, it may probably shed a different light on hitherto well analyzed and described depressive disorders (e.g., recent studies on controlled, attention-dependent processing in depression, using verbal stimuli, have questioned the widely accepted hypothesis concerning the handicap of effortful processes in depressive disorders; this research appealed to the semantic priming paradigm, and used a visual lexical decision task; see Georgieff et al., 1998), and thirdly, it may lead to promising implications for cognitive therapy of depression (e.g., Feldman Barrett, Lindquist, & Gendron [2007] present ample evidence that linguistic stimuli may serve as a context for perception of emotions, influencing their reception and interpretation; the so-called *language-as-context hypothesis*), resulting in creation of new therapeutic approaches.

Metaphorical Conceptualizations as a Way to Study Cognitive Representations of Some Notions in a Population of Patients Suffering from Depression and Other Mental Disorders

The analysis of metaphorical conceptualizations of some notions seems to be a promising way to study these notions' cognitive representations created by depressive people, since it appears that similar executive functions become disrupted in depression and are at the basis of metaphorical processing (particularly working memory, see *Section 5. Interindividual variability as a factor in research over metaphor processing*). It may serve as a trail indicating that there exist some potential differences between metaphorical conceptualizations created by individuals suffering from depression and the non-depressive ones.

Actually, studying metaphorical processing in groups of patients with different mental disorders is perceived as

more and more interesting by many psychological, as well as psychiatric, research teams. This tendency is obvious when one skims through topics raised in the latest publications. Many articles give evidence for disturbances in metaphorical processing accompanying different psychiatric and neurologic illness: schizophrenia (e.g., Langdon, Coltheart, Ward, & Catts, 2002, cited in Rapp, Leube, Erb, Grodd, & Kircher, 2007; Sponheim et al., 2003, cited in Stringaris et al., 2006), Alzheimer's disease (e.g., Papagno et al., 2003, cited in Stringaris et al., 2006), Asperger's syndrome (see Rapp, Leube, Erb, Grodd, & Kircher, 2004), autism (e.g., Seitz, 1996, cited in Seitz 2005), and alexitimy (Seitz, 2005), etc. Many pay attention to the neuropsychological basis of difficulties in understanding metaphorical language, often due to the pathogenic effects of a given illness or of brain injury (cf. e.g., Dennis & Barnes, 1990, cited in Rapp et al., 2004; Rapp et al., 2007; Stringaris et al., 2006; Saki, 1999, cited in Seitz, 2005).

Research on metaphorical processing may also be an inspiration for elaboration of new therapeutic methods. For example, a study by Holmes, Mathews, Dalgleish, and Mackintosh (2006) gives evidence that mental imagery seems to be more helpful than simple verbal stimuli processing in positive mood training and anxiety reduction (Holmes & Mathews, 2005). Therefore, properly chosen metaphors (understood in the perspective of imagery theories of metaphor, see e.g., Stępnik, 1988) may have been ideal stimuli for therapeutic help of such type. Metaphors, because of their open-ended nature and interpretative ambiguity (see e.g., Stringaris et al., 2006), can also be successfully used in a wide range of projective methods.

Binding Psychopathology with Linguistic and Psycholinguistic Theories

Raising the question of cognitive disorders appearing on the notional level calls for an interdisciplinary theoretical frame: It demands borrowing inspiration, not only from psychopathological theories, but also from linguistic and psycholinguistic perspectives and methods.

Language and Cognition

In a broad perspective, the topic under discussion is linked with the idea of a correspondence between language and cognition, which has been discussed for over half a century on the basis of cognitive psychology (Whorf, 1956 vs. Fodor, 1975; Kay & McDaniel, 1978; Pinker, 1994; for a relation between language and cognition in the light of the latest opinion, see e.g., Vigliocco & Filipovic Kleiner, 2004; for the role of cognition in chosen linguistic theories, see e.g., Butler, 2008). However, referring to the long tradition of studying this problem does not mean stating the obvious: The nature of the relation between language and cognition is still disputable, inspiring never-ending discussions (Attitude 1: Voices in favor of the influence of language on cognition, see e.g., Boroditsky, 2001: the case of time; Levinson, Kita, Haun, & Rasch, 2002: spatial language; Attitude 2: Articles claiming that language and cognition/performance are partly interdependent, see e.g. Gennari, Sloman, Malt, & Fitch, 2002: the correlation between linguistic conceptualization of motion events and performance of similarity and recognition memory tasks; Munnich, Landau, & Dosher, 2001: connections between spatial language and spatial memory; Chatterjee, 2001: the influence of language on mental representations of space; Attitude 3: Papers rejecting the influence of language on cognition – see e.g., Gallistel, 2002; Li and Gleitman, 2002: the case of spatial language – or even denying the correspondence between the linguistic and nonlinguistic categories, cf. Crawford, Regier, & Huttenlocher, 2000: an example of spatial categories).

Discussions about Definition and Characteristics of Metaphor

In a narrower perspective, studying metaphorical conceptualizations of separate notions calls for bearing with a very ambiguous and questionable definition of metaphor. The interest in metaphors dates back to Aristotle and has a very long and stormy history. Over the years, many different theories and definitions of metaphorical language have been proposed. Generally, the change in research direction can be characterized as a move from a standard pragmatic model, treating metaphor as an exception from literal language, towards models ascribing much more significance to metaphor in cognition and everyday communication (e.g., class inclusion model, cognitive theory of metaphor) and towards increasingly popular neuropsychological theories of metaphor.

The standard pragmatic model of metaphor (Grice, 1975; Searle, 1979; for a brief description, see e.g., Blasko, 1999) assumes that language has a primary literal character, so metaphors stand for exceptions violating conversational norms and demanding special processing (which consists of rejecting a literal interpretation as contextually irrelevant, and replacing it by a proper non-literal one). However, this model has recently been discredited: A strict separation of literal- from metaphorical language has been questioned (Gibbs, 1994, cited in Blasko, 1999); some have brought evidence that processing of metaphorical expressions (particularly based on apt metaphors, cf. Blasko & Connine, 1993, as cited in Blasko, 1999) is as quick and automatic as the literal ones (for a review, see Glucksberg, 2003). Finally, many have been trying to clarify the mechanism of metaphorical understanding: Theoretical models have explained the phenomenon of understanding metaphors either as a result of a comparison process and finding similarities between nonverbally expressed different expressions (cf. Rapp et

al., 2004; e.g., On what scores *marriage* is like *weather*?), as an implementation of analogy rules (cf., Gentner & Bowdle, 2001; e.g. *Marriage* shares some characteristics with *weather*), or as an effect of a class-inclusion process (cf. the class-inclusion model, see e.g., Glucksberg, 2001, 2003; for an empirical verification, see e.g., Jones & Estes, 2005; *Marriage* and *weather* belong to a class of objects sharing some common properties).

Metaphor as a Basic Cognitive Tool

Lakoff's and Johnson's theory of metaphor (e.g., Lakoff, 1987; Lakoff & Johnson 1980a, 1980b; Turner, 1993), also referred to as *the standard metaphor theory* (see e.g., Seitz, 2005) or *the conceptual mapping view* (cf. e.g., Keysar, Shen, Glucksberg, & Horton, 2000), seems to be a theory most strongly binding cognition with language, and that is why it is necessary to mention it while discussing the problem of cognitive distortions existing on the notional level. This theory assumes that metaphors lie at the basis of human conceptual functioning and play a main role in structuring our experience (and, what is more, to a degree underestimated by most people, cf. Thibodeau & Durgin, 2008). An important thread in the conceptual theory of metaphor highlights the physical, embodied basis of the most fundamental conceptual metaphors, resulting from the interaction of an individual and the environment (e.g., a child learning how to stand up is acquiring a conceptual metaphor UP IS GOOD).

Two assumptions underlie the cognitive theory of metaphor: a conceptual assumption and a linguistic one (for a discussion, see Keysar et al., 2000). The first claims that all concepts (except for a few purely perceptual, experiential notions) have a metaphorical structure. A metaphor is treated not as a stylistic ornament, but as a fundamental mental operation, reaching back to the prelinguistic experiences of a human-being, consisting of understanding new, complicated, or abstract domains of knowledge in terms of other concepts, connected with different, more basic experience (e.g., Lakoff, 1993; see also Libura, 2000). For instance, the notions of SADNESS and HAPPINESS borrow their structure from fundamental, experiential concepts of DOWN (SADNESS) and UP (HAPPINESS). The followers of Lakoff's and Johnson's theory claim that metaphors allow us to understand abstract concepts, mapping on them the structure of familiar, experienced, and well-known phenomena (e.g., LOVE IS A JOURNEY); so they should be treated as a basic tool of human cognition (e.g., Johnson, 1992).

The second, linguistic, assumption takes for granted that these deep metaphorical mappings, occurring on a conceptual level, are reflected in commonly used linguistic expressions (e.g., expressions like *My spirits rose* or *Thinking about her always gives me a lift* are realizations of the conceptual metaphor HAPPY IS UP, and sentences like *I'm depressed* or *My spirits sank* – of conceptual metaphor SAD IS DOWN; Lakoff and Johnson, 1980a, p. 15; as cited in Keysar et al., 2000). It is worth noting that this assumption results in an important methodological implication. It confirms that the analysis of metaphorical expressions used by people allows us to infer about deep cognitive mechanisms operating on the conceptual level (in the case under discussion, about depressive cognitive distortions).

The Lakoff's and Johnson's theory has appeared to be very influential, not only in cognitive sciences, but also in other disciplines (e.g., in literature studies; cf. discussion in Keysar et al., 2000), and, what is more, has been arousing much controversy. Among the latest publications one can find papers confirming, as well as denying, its psychological reality. The following publications are examples of papers confirming the conceptual theory of metaphor: articles bringing empirical evidence in favor of the claim that language is a very important tool shaping our thoughts about abstract domains (particularly about time, cf. e.g., Boroditsky, 2000, 2001; Casasanto & Boroditsky, 2008), publications demonstrating that conceptual mappings in conventional metaphors are still productive (Thibodeau & Durgin, 2008), or that metaphors group in clusters, listed by Lakoff and Johnson (1980b; studies on Chinese language: Yu, 2004; and on Italian language: Deignan & Potter, 2004, cited in Thibodeau & Durgin, 2008). Publications indicating that there exist many similarities between the phenomenon of synesthesia (the existence of which is empirically well confirmed; for the latest research, see e.g., Barnett et al., 2008; Grossenbacher & Lovelace, 2001; Mulvenna & Walsh, 2006; Ward & Simner, 2003) and metaphor are another source of support for the conceptual metaphor theory. There occur some voices that synestethic experience, which is an automatic process, operating beyond control of an individual (Cytowic, 2002a, 2002b, cited in Seitz, 2005), is indeed a phenomenon analogous to processing of metaphors, which is automatic, rapid, and independent of conscious thinking processes as well (cf. Seitz, 2005). Moreover, on the grounds of developmental psycholinguistics, it has been shown that 2-year olds, or even younger children, are capable of metaphorical processing (see e.g., Eichstedt, Serbin, & Poulin-Dubois, 1998; Eichstedt, Serbin, Poulin-Dubois, & Sen, 2002), what was interpreted as another argument for a distinctive place of metaphor in cognition and structuring human experience.

Along with publications supporting the conceptual metaphor view, many question its assumptions. Recent publications criticize the conceptual, as well as the linguistic, assumption. For example, Keysar and co-workers (2000), after conducting a series of three experiments, demonstrated that we don't have to use metaphorical mappings in dealing with well-known, conventional metaphorical expressions, which can also be understood directly (nevertheless, researchers are open to the possibility that the mappings may be useful in interpreting new original metaphors, cf. also McGlone, 1996, cited in Keysar et al., 2000; Gernsbacher,

Keysar, Robertson, & Werner, 2001). Many have speculated whether, in general, some concepts (e.g., emotions) can be metaphorically conceptualized. For instance, it has been argued that children are undoubtedly able to understand the notion of ANGER without previously acquiring knowledge about the properties of liquids heated under pressure (for a review, see Keysar et al., 2000). Referring only to linguistic evidence (in explanations of a functional correspondence between thought and language) has been reviewed as at least disputable and circular (e.g., how do we know that people think about *joy* and *sadness* in terms of UP and DOWN categories? Because they speak about *joy* and *sadness* using words like *up* and *down*. So why do people use expressions like *his spirits rose*? Because they think of *happiness* in terms of the UP category; cf. e.g., Glucksberg, 1988, as cited in Keysar et al., 2000; Murphy, 1996). Other papers have questioned the assumption that metaphors are omnipresent in human language and have pointed to linguistic stimuli (e.g., idioms) which are processed in a totally different way (e.g., participants in Gibbs' and Nayak's, 1991, experiments, filled the text with idioms stylistically rather than metaphorically consistent with expressions used before; see Keysar et al., 2000). The authors of the conceptual theory of metaphor have been criticized also for overgeneralizations and lack of precision. For example, some claimed that Lakoff and Johnson did not precisely say what kind of relations were included in conceptual mappings and that thay did not clarify what in these mappings was semantically highlighted (Seitz, 2005). Others demonstrated that this theory omits the problem of interindividual variability in understanding metaphors, which should be raised by any theory of metaphorical processing (Blasko, 1999).

Independently of ambiguous opinions about the conceptual metaphor theory, one must agree that it has appeared to be a conception extraordinarily inspiring for new research teams. Nearly all theories of metaphor described in the recent literature are constructed either on the basis of (e.g., the metaphoric structuring view; see Boroditsky, 2000) or in opposition to (e.g., a perspective of Thibodeau & Durgin, 2008, based rather on the relevance theory, see e.g., Wilson & Sperber, 2004) cognitive linguists' proposal; all, however, with reference to it. An example of an idea touched by Lakoff and Johnson and intensely developed in actual cognitive science is an assumption about embodied bases of thought (the embodied theory of cognition; for a review, see Keijzer, 2001, cited in Chamero, 2001). Recent publications frequently adopt a theoretical frame describing cognition as a result of bodily interactions with environment (Clark, 2006; Seitz, 2000; Thompson & Varela, 2001; Van Der Gucht, Willems, & De Cuypere, 2007), which is reflected also in human language (e.g., Tyler & Evans, 2003b, cited in Van Der Gucht et al., 2007); it is even postulated that there is a new trend in modeling which emphasizes that even a model itself should have a body to be adequate enough (cf. Schlesinger, 2001).

Neuropsychological Theories of Metaphor

The question of neuropsychological bases of metaphor understanding seems to be of interest from the perspective of the analysis of different cognitive distortions observed on the notional level in a variety of mental disorders (the etiology of which is *nota bene* frequently explained as a result of brain mechanism disturbances). The "neuropsychological assumption", often present in cognitive linguistic theories, is nowadays frequently developed in recent psycholinguistic theories of metaphorical processing, what can be perceived as the recent tendency to integrate linguistics with neuronal theories (cf. Kravchenko, 2006). Many recent papers (e.g., Johnson, 1999) adopt neuropsychological perspective in explaining the embodied cognition and conceptual mappings phenomena (e.g., conceptual mappings are described as a result of neural connections). They refer to the process of formation of appropriate routes and neural structures in the human brain (*Conceptual structure arises from our sensorimotor experience and the neural structures that give rise to it*, Lakoff and Johnson, 1999, p. 77; as cited in Kravchenko, 2006).

Within the last years one may notice a huge development of studies on understanding metaphors which use neuroimaging methods (for the first neuroimaging study on metaphor processing, see Bottini et al., 1994, cited in Schmidt et al., 2007); not only focusing on processing separate metaphorical word pairs (cf. e.g., Lee & Dapretto, 2006; Mashal et al., 2005, 2007, cited in Shibata, Abe, Terao, & Miyamoto, 2007), but also on the whole metaphorical sentences (e.g., Ahrens et al., 2007; Eviatar & Just, 2006; Rapp et al., 2007; Stringaris et al., 2006, 2007; cited in Shibata, Abe, Terao, & Miyamoto, 2007). Generally, their results (e.g., fMRI studies, see Shibata et al., 2007) bring evidence that there exists a special neural mechanism responsible for processing of metaphors. Moreover, some publications demonstrate that different types of metaphors correspond to specific brain networks (e.g., basic metaphor theory, enumerating four separate types of fundamental metaphors with different neuronal bases, based on different conceptual mappings: (a) perceptual–perceptual, (b) cross-modal, (c) movement–movement, (d) perceptual-affective; Seitz, 2005).

Neuropsychological theories of metaphor are more and more prevalent in the present literature (e.g., Schnitzer & Pedreira, 2005; see also Feldman, 2006; Gibbs, 2006) what can be understood as a realization of a more general tendency in recent psycholinguistic theories to emphasize the neural bases of language (e.g., the neural theory of language, Feldman & Narayanan, 2004; the network model of human language, Markošová, 2008; see also Clark, 2006). Generally, as in cognitive linguistics, these theories assume that metaphorical thinking has a primary nature; however, they appeal mainly to neuropsychological arguments, based on the classic connectionist theories (Hebb, 1949; Hayek, 1952). It is assumed that metaphorical thinking is

a result and can be explained in terms of the human brain's architecture: *If connectionism is an appropriate model of human cognition, then the existence of metaphor is predictable from the way that the brain functions* (Schnitzer & Pedreira, 2005, p. 32). In this perspective, metaphors are understood not as figures of speech, but as neuronal maps (cf. also Lakoff & Johnson, 1999) connecting the network of metaphorical vehicle with the network of the metaphorical topic (Schnitzer & Pedreira); for example, the network of JOURNEY with the network of LOVE in the instance of the well known Lakoff's and Johnson's (1980) metaphor LOVE IS A JOURNEY. While metaphorical processing, an integrated circuit is immediately created, so a domain of a vehicle, as well as a domain of a topic can be processed simultaneously (cf. Tendahl & Gibbs, 2008). In the light of neuropsychological theories, metaphors appear to be so indispensable a phenomenon because of the specificity of the learning processes. According to connectionist theories, knowledge is gathered due to the creation, reinforcement, or modification of synaptic links on the basis of repeated activations (the connection may be weakened in an analogical way). The learning process is quickest and most effective when assimilation of information demands a minimal change in the network of connections (Goldbaum, 2001, as cited in Schnitzer & Pedreira, 2005, p. 42). Due to metaphor, we can understand more complicated experiences in terms of simpler and more basic ones, which is why metaphors should be perceived as a fundamental human cognitive tool.

Interindividual Variability as a Factor in Research on Metaphors Processing

The study of metaphorical conceptualizations of notions created by individuals suffering from depressive disorders requires an assumption about interindividual variability in metaphor processing. Recently, there has been much evidence that individual differences might have been a predictor of performance in a variety of linguistic tasks (e.g., Gemsbacher, 1990; Just & Carpenter, 1992, cited in Blasko, 1999); however, the claim that given characteristics of a subject influence metaphorical processing has been scantly empirically verified (cf. discussion in Blasko, 1999, who indicates that studying which properties of an individual can potentially influence metaphor understanding is an important goal for the future). The question of given metaphoric properties (e.g., metaphor familiarity, metaphor aptness) that influence the shape of metaphorical processing has raised much more interest (see *Section 6. The properties of metaphors influencing the process of metaphorical understanding*). It is still questionable which exactly variables in the individual differences area evoke differences in the course of the metaphor understanding process. It seems that this is not the case of cultural and language differences (the results of neuropsychological studies on groups of English, German, Mandarin-Chinese, and Japanese speakers are described in Shibata et al., 2007); the trail directs us rather towards individual differences in working memory capacity and effectiveness of cognitive functions.

Kintsch's predication model (Kintsch, 2000, 2001; cf. description and comments in Chiappe & Chiappe, 2007) is an example of a theoretical conception predicting that working memory influences metaphorical processing. The model explains the phenomenon of understanding metaphors in terms of a process of spreading activation in a self-inhibitory network, composed of a predicate *P*, an argument *A* (i.e., vehicle and topic of a metaphor), and *n* nearest neighbours of *P*. All meanings strongly connected with a predicate but not linked with an argument (cf. LOVE IS A JOURNEY metaphor and a journey's property of numerous changes of the means of transport) are inhibited by the properties in the predicate's neighbourhood which can be attributed to an argument (cf., love's property of constancy and inviolability). The concepts with the biggest resulting activation are used to create a vector representing the meaning of a metaphorical expression. Kintsch's model assumes that individual differences in working memory capacity and efficiency of executive functions (especially inhibition processes) influence the processing of metaphors. Low working memory span individuals (a) may not have enough resources to activate a suitably developed network and (b) could hardly manage to inhibit the salient but irrelevant predicate properties; and that is why they usually give an interpretation of a metaphorical expression more slowly than high working memory span subjects, and their interpretations are less accurate (see also Blasko, 1999; Gernsbacher et al., 2001). The capacity theory of language (Just & Carpenter, 1992), explaining the differences in performance in tasks demanding metaphorical processing, is another example of a theory assuming that working memory capacity influences the speed and effectiveness of understanding metaphorical expressions.

The predictions resulting from Kintsch's model have been recently empirically confirmed by the study of Chiappe and Chiappe (2007) on the understanding and production of metaphors by adult healthy individuals: It appeared that working memory, independently of print exposure and vocabulary knowledge, influenced the metaphors' processing. The outcome of studies, concentrated *stricte* on testing the influence of working memory on the process of metaphors' evaluation and interpretation (Blasko & Trich, 1997; cited in Blasko, 1999), leave no room for doubt as well: It clearly demonstrates the significance of the working memory variable in research on metaphorical processing. The participants of the experiment were divided (after a pretest, the reading span task, Daneman & Carpenter, 1980, cited in Blasko, 1999) into three groups differing on the score of working memory capacity (low, medium, and high wor-

king memory span groups). The task was to read 32 stimuli metaphors and afterwards to interpret them in one's own words. All interpretations given by participants were evaluated on 7-point scales by competent raters. The analysis revealed that it was the high working memory span subjects whose interpretations were the best (the most profound and exhaustive). Similar results were obtained in a recent study on the understanding of metaphorical language in a group of people suffering from Parkinson's disease (Monetta & Pell, 2007). The research, using a metaphor comprehension task (Gernbascher et al., 2001), showed that the only group performing worse in metaphor processing, was patients with deficits in working memory (the measure was verbal working memory span).

Taking into account the results of empirical studies discussed above and the existence of memory deficits in patients suffering from depression, one may expect that there will appear some differences in performance between groups of depressive and non-depressive people in tasks using metaphorical stimuli. Nevertheless, as far as I know, that question has not yet been raised and described in the recent literature.

The Properties of Metaphors Influencing the Process of Metaphorical Understanding

The Dimension of Metaphoricity

As mentioned above, the influence of given properties of metaphors on the process on their reception and understanding has appeared to be a question raising much more interest than given characteristics of an individual. The review of recent theoretical proposals and empirical studies seem to be in so far important, as to make a crucial methodological indication which aspects/dimensions of metaphors should be taken into consideration while examining notional cognitive distortions appearing in depressive people.

From the theoretical point of view, different factors potentially influencing metaphorical processing were proposed in different theories of metaphor. For example, the structure-mapping model (Gentner, Bowdle, Wolff, & Boronat, 2001) pointed to conventionalization, while the class-inclusion model (Glucksberg, 2001, 2003) indicated aptness (Winner & Gardner, 1977, as cited in Jones & Estes, 2005). Nevertheless, the right hemisphere theory of metaphor processing (Winner & Gardner, 1977, cited in Rapp et al., 2007) has appeared to be a theory which has evoked the most heated disputes in the literature and has been the strongest inspiration for research on key properties of a metaphor influencing the process of metaphors' reception and understanding. Its fundamental assumption states that figurative meanings are processed mainly by the right hemisphere (RH), which plays a special role in processing non-literal language (metaphors, humour, irony, sarcasm, proverbs; see Burgess & Chiarello, 1996; Coulson & Wu, 2005; Mitchell & Crow, 2005; as cited in Rapp et al., 2007). Indeed, although initially a lot of studies empirically confirmed the predictions of the RH hypothesis (for study using a divided visual field technique, see Anaki et al., 1998, cited in Schmidt, DeBuse, & Seger, 2007; for observations from lesion studies, see Brownell et al., 1990, cited in Stringaris et al., 2006; MacKenzie, Begg, Brady, & Lees, 1997; Winner, & Gardner, 1977, cited in Rapp et al., 2004; for PET studies, see Bottini et al., 1994, cited in Stringaris et al., 2006; for a review, see Editorial in *Brain and Language*, *100*, 2007); nevertheless, since then more recent publications have questioned a simple dependence: metaphorical processing–right hemisphere activation. For instance, Shibata, Abe, Terao, and Miyamoto (2007), using fMRI technique, have demonstrated that both hemispheres are activated (left hemisphere, LH, even more) while processing metaphorical stimuli. Rapp with co-workers (2004, 2007, fMRI studies) has even shown that processing metaphorical sentences is connected with the LH, and not RH activation (cf. also the results obtained by Faust & Weisper, 2000; Lee & Dapretto, 2006; Olivery, Romero, & Papagno, 2004; Stringaris et al., 2006; Zaidel, Kasher, Soroker, & Batori, 2002, cited in Mashal & Faust, 2008).

Generally, two theories seem to provide an adequate theoretical frame to explain the inconsistent results of studies on the influence of the metaphoricity dimension on the pattern of semantic processing (cf. Shibata et al., 2007): the GSH theory (the graded salience hypothesis; Giora, 1997, 2002) and the coarse coding theory (cf. e.g., Beeman, 1998; Jung-Beeman, 2005). The first of them assumes that semantic processing is determined by the degree of semantic saliance (i.e., by familiarity, frequency, prominence, conventionalization, prototypicality, and context-dependence), and that conventionality, familiarity of an linguistic item, is a variable the most strongly influencing the pattern of neuronal representation (the GSH model was described after Mashal & Faust, 2008; Stringaris et al., 2006). Strictly speaking, the GHS theory predicts that more salient, familiar meanings will be processed by the LH, while original, untypical semantic relations (e.g., occurring in new, unconventional metaphorical expressions) will activate the RH. The coarse coding theory (the model described after Mashal & Faust, 2008; Schmidt et al., 2007) brings similar predictions. It assumes that both hemispheres contribute to semantic processing; however, each in its own way: After encountering a given linguistic stimulus, LH engages in fine semantic coding in a narrow semantic field, while at the same time RH is responsible for activation of a wide range of semantic meanings in a larger, but weaker, semantic field, composed of many different meanings and semantic associations (so-called *coarse semantic coding*). In a situation of semantic ambiguity, it is so more advantageous to activate a wider field of semantic meanings: The meaning can then be ascribed more aptly.

In summary, at present it seems that the dimension of metaphoricity is not enough to fully explain the differences in the pattern of brain activation: There is a need to take into account other, less general, factors (cf. *Brain and Language*, *100*, 2007, a special issue devoted to studies on the brain-metaphor relation).

The Dimension of Conventionality

Generally, as one can notice, the theories discussed above indicate conventionality/ familiarity as a factor with the highest impact on the course of metaphorical processing. And indeed, this prediction has been recently strongly verified empirically. For instance, Blasko and co-workers demonstrated that conventionalization is one of the factors influencing the rate of processing metaphors (cf. studies with the use of a cross-modal priming technique: highly familiar metaphors resulted in immediate activation of a metaphorical meaning, Blasko & Connine, 1993, cited in Blasko, 1999; or studies recording tracked readers' eye-movements: conventional metaphors were read more rapidly by participants of the experiment); and Keysar and co-workers (2000) demonstrated that frequently used, conventional, expressions (e.g., *arms, legs, seats,* and *backs* of *chairs*) indeed function like frozen metaphors, and are processed differently in comparison to new, unfamiliar metaphorical stimuli. One of the most recent experiments conducted in the divided visual field technique (Schmidt et al., 2007) can serve as another example demonstrating the importance of the conventionality dimension in research on metaphors. In this study, the degree of familiarity of used metaphors was a subject of manipulation: All metaphorical stimuli (taken from Bottini et al., 1994, as cited in Schmidt et al., 2007) were divided into four classes differing in degree of conventionality (*The pretentious young lady was 100% polyester* was an example of a highly unfamiliar metaphor). The results demonstrate that this is the conventionality dimension which better (in comparison to simple metaphoricity/non-metaphoricity opposition) explains the patterns of activations observed during semantic processing (highly familiar metaphors were more rapidly processed by the LH, while the original and unconventional ones – by the RH). Similar conclusions come from one of the latest studies with the use of fMRI technique (Mashal, Faust, Hendler, & Jung-Beeman, 2007). They concentrated on the analysis of neuronal networks responsible for processing couples of words creating (a) literal, (b) absurd, (c) conventional metaphorical, and (d) new metaphorical meanings. Based on the observation of active brain areas, it appeared that it was the conventionalization–originality dimension (not the metaphoricity–non-metaphoricity one) which differentiated the patterns of brain activation (processing only new metaphorical expressions, e.g., *pearl tears*, evoked increased activation in the right posterior superior temporal sulcus, right inferior frontal gyrus, and left middle frontal gyrus). Analogical findings were reported by recent lesion studies (e.g., Giora, Zaidel, Soroker, Batori, & Kasher, 2000; for a brief review, see Editorial, *Brain and Language*, *100*, 2007).

The conventionality dimension has appeared to be so important that some have even been speculating whether familiar, conventional metaphors should in general be treated like non-literal expressions. For example, Keysar et al. (2000) claims that conventional metaphors, listed by Lakoff and Johnson, are no more productive, and do not provide a fundament for new conceptual mappings. However, their conclusions have been questioned by Thibodieu and Durgin (2008), who demonstrated that conventional metaphors remain productive and simplify the process of mapping relevant conceptual structures in understanding novel metaphorical language.

Other Dimensions in Studies on Metaphorical Processing

In comparison to the conventionality dimension, other factors raise less interest in the recent literature. However, metaphor aptness (metaphor goodness) is indicated quite often as an important mediator of the process of understanding metaphorical expressions. *Metaphor aptness* is usually defined as the extent to which a statement captures important features of the topic (Chiappe, Kennedy, & Smykowski, 2003, as cited in Jones & Estes, 2005), the extent how well the metaphor expresses its specific non-literal meaning (Blasko & Connine, 1993, as cited in Jones & Estes, 2005), or as the prototypicality of an *ad hoc* category, created as a result of interaction of a metaphor's vehicle and topic (e.g., the metaphor *The ideas were gold* may be recognized as an apt one, because *gold* is a label of an *ad hoc* category for "valuable and rare objects"; cf. the categorization approach, Glucksberg & Keysar, 1990, cited in Blasko, 1999). The dimension of metaphor aptness is frequently listed as one of the important features shaping the process of metaphor reception and understanding. Some have even claimed that it influences the speed of metaphorical processing (see e.g., Blasko, 1999) or the metaphorical process of class-inclusion (metaphor-induced categorization occurred on a larger scale with apt metaphors, e.g., *To what extent is a TREE a member of the category UMBRELLA?*; than with the less apt ones, e.g., *To what extent is a STORM a member of the category COFFEEPOT?*; Jones & Estes, 2005; cf. the class-inclusion model, Glucksberg, 2001, 2003).

The settlement of a metaphor in a broader sentential context is another feature of metaphorical stimuli taken into consideration by researchers studying processing metaphorical stimuli. The majority of already conducted studies have concentrated on the processing of semantic relations (metaphorical, e.g., *deep—wise*, in comparison to non-metaphorical, e.g., *suit—trial*) taking place between

separate word pairs (cf. remarks in Schmidt et al., 2007). Nevertheless, there have recently been more and more voices that sentential context may significantly influence the course of the process lying at the basis of understanding metaphors and, particularly, that processing of separate word pairs probably engages different mechanisms than processing bigger semantic units (i.e., phrases, sentences, etc.; cf. Rapp et al., 2004; Rapp et al., 2007). The use of sentential metaphors obliges the participants to make use of sentential context in metaphorical processing, and, thereby, gives the possibility to enlarge the research area and study highly unconventional, unfamiliar metaphors, which could not be understood without an appropriate word context (cf. Schmidt et al., 2007). There have also been some questions about a syntactic schema of a metaphorical sentence, which would be adequate to study metaphor processing. Some claim that too complex syntax would probably lead to artifacts, a result of semantic processing, and independent of the process of understanding metaphors. *An A is a B* seems to be the most frequently used schema in studies using metaphorical sentences (see e.g., Rapp et al., 2004, Rapp et al., 2007, for studies on German material; Shibata et al., 2007, for studies on Japanese material).

As a matter of fact, the dimensions of metaphor conventionality (familiarity), aptness, and settlement in a broader semantic context embrace a list of features commonly taken into account in recent studies on metaphorical processing. Other dimensions are rather rarely mentioned (e.g., Paivio and Walsh, 1993, cited in Blasko, 1999, discuss the imagery dimension, setting forth arguments for the fact that metaphors evoking vivid mental imagery are understood quicker and are better remembered by participants of experiments). Valence (positive or negative meaning, positive or negative connotation) seems to be the feature which could potentially be important in research on metaphorical conceptualizations created by people suffering from depression or other affective disorders. Nevertheless, in recent studies this dimension is included only rarely (e.g., Rapp et al., 2004, 2007, pay attention, among others, to the dimension of valence of metaphorical stimuli used in their experiments), which could possibly indicate the need of taking it into consideration in future research projects.

Proposal of a Research Project on Metaphorical Conceptualizations of Some Notions, Created by Depressive People

Taking into account:

(a) previous lack of interest of the notional level of cognitive distortions observed with individuals suffering from depression,
(b) existence of similarities between cognitive functions responsible for metaphorical processing, and functions disturbed as a result of depression,
(c) fruitfulness of already conducted research on processing metaphorical stimuli by patients with different mental disorders,
(d) continuous discussions over theories on the relation between language and cognition,
(e) the need to study some aspects neglected by research on metaphors so far conducted (e.g., interindividual differences in metaphorical processing, with particular regard to the deterioration of mood variable; the dimension of metaphor valence),
(f) the more and more frequently formulated postulates of adopting an interdisciplinary perspective in psychological and linguistic studies;

it is tempting to conduct a research project that will raise and develop, even to a small degree, the questions listed above.

Assumptions

A project studying metaphorical conceptualizations of some notions in a group of depressive people, now conducted in the Faculty of Psychology at the University of Warsaw (for a description of results obtained in the first stage of the study, see Bartczak, 2008), is an attempt to realize the postulates under discussion. Its goal is to determine if (and how) the "intensity of depression" variable (the indicator: the performance in Beck's Depression Inventory; Beck, 1973) correlates with formation of cognitive representations of notions; and if its potential influence recedes during the periods of remission. The number of created metaphors and their characteristics: valence (positive or negative meaning) and the degree of conventionality are treated as indicators of the shape of a given notion's cognitive representation.

Research hypotheses were derived on the basis of (a) theoretical premises (among others, the cognitive theory of depression, particularly, the content-specificity hypothesis; neuropsychological theories of metaphor; theories emphasizing the existence of strong connections between metaphor and cognition; see Sections 1-3); (b) the results of studies on cognitive functioning in depression, indicating that some cognitive functions (e.g., working memory) become disordered during depressive states (see Section 1); (c) conclusions from research on metaphor processing, indicating that efficient working memory mechanisms are indispensable for good understanding and creating of metaphorical expressions (see Section 4); and (d) results of studies supporting the fact that even those who have recovered from depression demonstrate a specific pattern of information processing (e.g., Atchley, Stringer, Mathias, Ilardi, & Minatrea, 2007). The following predictions were made: (1) The intensity of depression correlates with changes in cognitive representations of notions, in particular: (a) depressive people will create fewer metaphors of a given notion than healthy (non-depressive) individuals, (b) patients suffering from depression, in

Table 1. Percentage of metaphors (created by participants in the first stage of research) with positive and negative axiological meaning

		Percentage of metaphors with positive axiological meaning											
		PAST		PLEASURE		FUTURE		JOY		SADNESS		HAPPINESS	
NT	EG	7.7	$U = 1.000$	7.7	$U = 0.234$	7.7	$U = 1.000$	23.1	$U = 0.313$	38.5	$U = 0.543$	15.4	$U = 0.127$
	CG	4.3		21.7		4.3		30.4		8.6		30.4	
UMST	EG	6.2	$U = 0.852$	28.1	$U = 0.817$	3.5	$U = 0.106$	29.1	$U = 0.349$	4.2	$U = 0.503$	27.1	$U = 0.727$
	CG	3.6		25.4		13.6		30.9		0.9		25.4	
		Percentage of metaphors with negative axiological meaning											
		PAST		PLEASURE		FUTURE		JOY		SADNESS		HAPPINESS	
NT	EG	23.8	$U = 0.234$	0.0	$U = 1.000$	47.6	$U = 0.142$	0.0	$U = 1.000$	28.6	$U = 0.739$	0.0	$U = 1.000$
	CG	5.9		0.0		17.6		0.0		76.5		0.0	
UMST	EG	20.6	$U = 0.155$	5.9	$U = 0.503$	14.7	$U = 0.020$	4.4	$U = 0.147$	51.5	$U = 0.452$	2.9	$U = 0.942$
	CG	17.8		4.4		2.2		0.0		73.3		2.2	

Note. EG = experimental group, CG = control group, UMST = unfinished metaphorical sentences test, NT = narrative task.

comparison with healthy subjects, will create relatively more metaphors of notions with negative meaning, (c) depressive people will create (and prefer) relatively more negatively-characterized metaphors for each notion, independently of its valence (positive or negative characterizing); and (2) the depressive pattern of cognitive representation will be maintained also during periods of remission.

The First Stage of Research

Two stages of research compose the research project. Two 10-person groups (the experimental group, EG, and the control group, CG) participated in the first stage (studies conducted in 2007 and 2008). EG included adult depressive patients of a Warsaw hospital (Szpital Wolski; BDI: $M = 20.7$; range 14-39), while CG was composed of non-depressive medical workers of the same hospital (BDI: $M = 4.1$; range 0-9). Both groups were balanced for sex, education, and residence. All participants completed, among others, the Unfinished Metaphorical Sentences Test (UMST), and were instructed to write six short narratives (entitled *Past*, *Pleasure*, *Future*, *Joy*, *Sadness*, and *Happiness*) of unrestricted length and form. The UMST was the author's tool, constructed on the basis of different theoretical proposals of a metaphor sentence schema. Five sentential structures were used for each notion: *X is Y*, *X equals Y*, *X is like Y on the score of z*, *When I imagine X, I see Y*, and *It might be said that X is not X but Y* (all sentences were presented in random order).

Six notions occurring in the theoretical characterization of depressive disorder were chosen for analysis: PAST, PLEASURE, FUTURE, JOY, SADNESS, and HAPPINESS, since, in the literature describing symptoms of this disease they are often used with reference to cognitive distortions prevalent among patients with depression (e.g., Pużyński, 2002, p. 360; Andreasen, 2003, p. 234; Rosenhan, Seligman, & Walker, 2003, p. 272). However, for further analyses there were chosen only notions the analysis of which has revealed the intergroup differences (PAST, FUTURE, JOY, SADNESS, and HAPPINESS).

The results obtained in the first stage of the research were not univocal (for detailed description and discussion, see Bartczak, 2008). The analysis did not reveal the existence of any general regularity, common for all notions and independent of the task. Nevertheless, there was a tendency to create a smaller number of metaphors by depressive people (especially concerning the notion of FUTURE), what might be interpreted as a result of difficulties with metaphorical processing, evoked by depression. Moreover, depressive subjects produced more negative metaphors for some, but not for all notions (see Table 1). This fact would testify to the necessary regard for semantics in studies on the mechanisms of metaphorical processing in the group of depressive people.

The Second Stage of Research

Three 30-person groups (balanced for sex, education, and residence) will participate in the next stage of research: (a) a group of patients suffering from depression, (b) a group of people with depression during remission, and

(c) a group of non-depressive individuals. The selection of participants for groups (a) and (b) will be made in strict cooperation with psychiatrists, on the basis of ICD-10 diagnostic criteria (Pużyński & Wciórka, 1997) and the Beck Depression Inventory (BDI). All participants will be asked to complete the Unfinished Metaphorical Sentences Test (UMST) and the Questionnaire of the Metaphorical Conceptualization of a Notion (QMCN). QMCN was constructed with the use of metaphors created in narratives written previously (in the first stage of research) by depressive and non-depressive participants (for detailed description of QMCN, see Bartczak, 2009). Entries to which competent raters ascribed the highest and the lowest rates on valence and conventionality scales were chosen for the tool. The task is to rate each metaphorical sentence on a 5-point "relevance" scale. Additionally, a word association test and a projective method will be used. These methods will have an auxiliary nature, allowing us to infer about relations created between analyzed notions and the shape of their semantic fields. The word association test seems to be sensitive enough to detect differences in semantic processing between depressive and non-depressive groups (*nota bene* it has recently often been used in studies on cognitive deficits in different disorders, e.g., in Alzheimer's disease, see Gollan, Salmon, & Paxton, 2006; or in Parkinson's disease, see Foster et al., 2008); since it is generally assumed that the same cognitive functions are involved in the process of binding associations and become disordered as a result of depression (see Section 2. *Cognitive distortions in depression: A well analyzed and verified phenomenon*): memory capacity (Addis & McAndrews, 2006), attention processes, and executive functions (cf. discussion concerning the use of COWAT, *The Controlled Oral Word Association Test,* Benton, Hamsher, & Sivan, 1983, cited in Ross et al., 2007). A projective method, relying on imaging analyzed notions as "guests" which come to a party and sit at a table, can then be treated like a specific version of a semantic distance latency test, used in studies on cognitive representations of different categories and notions (see e.g., Chiao, Bordeaux, & Ambady, 2004, for research on cognitive representations of social distance categories).

Implications

The realization of the present project may have important theoretical and practical implications. Results obtained may give interesting information about the nature of cognitive changes observed in depression, enlarging the research area with the notional level, as well as being an important step in unsolved theoretical discussions (cf. doubts concerning withdrawal of cognitive changes during periods of remission, interindividual variability in metaphor processing, discussions about dimensions of metaphorical stimuli influencing their creation and understanding). The elaboration of promising tools to study metaphorical conceptualizations of notions, and useful in differentiating people differing in the area of mood, can be an example of the practical implications of the project under discussion. Finally, raising the question of depressive metaphorical conceptualizations of given notions may be important from the perspective of cognitive therapy of people suffering from depression (cf. proofs for the usefulness of the imagery techniques in affective disorders' treatment, Holmes & Mathews, 2005; Holmes et al., 2006). Results are to be published after conducting the second stage of research.

The Advantages of the Interdisciplinary Account in Psychological and Linguistic Studies

As mentioned at the beginning of the article, the study of notional cognitive distortions occurring in depression calls for an interdisciplinary theoretical and methodological frame: One should appeal to psychopathological, psychological, and linguistic theories. In the recent literature, many emphasize the advantages of interdisciplinary research. For instance, Xu (2007) points to the necessity of an interdisciplinary account in cognitive science (on the example of studies on notions); Kravchenko (2006), while describing a new theoretical frame for language and cognition, based on the autopoiesis theory (Maturana, 1970, cited in Kravchenko), claims that the integration of linguistics with biological and psychological studies is an evident tendency in modern linguistics; and Buttler's article (2008), describing the role of cognition in different linguistic theories, ends with a postulate to integrate linguistics, cognitive psychology, neurology, neurolinguistics, and sociocultural studies. The approach overcoming the limits of one discipline enables development of new research questions and brings some new quality to unresolved theoretical discussions. Therefore, the problem of cognitive notional disorders in depression may be perceived as an inspiration for psychopathologists, as well as for linguists, psycholinguists, and cognitive psychologists.

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