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**Verbs as Linguistic Markers of Social Agency - The Social Side of Grammar**

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**Verbs as Linguistic Markers of Agency - The Social Side of Grammar**

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**Abstract**

Basic grammatical categories may carry social meaning irrespective of their semantic content. In a set of four studies, we demonstrate that verbs – a basic linguistic category present and distinguishable in most languages – are related to the perception of agency, a fundamental dimension in social perception. In an archival analysis on actual language use in Polish and German, we found that targets stereotypically associated with high agency (men and young people) are presented in the immediate neighborhood of a verb more often than non-agentic social targets (women and old people). Moreover, in three experiments using a pseudo-word paradigm, verbs (but not adjectives and nouns) were consistently associated with agency (but not communion). These results provide consistent evidence that verbs, as grammatical vehicles of action, are linguistic markers of agency. In demonstrating meta-semantic effects of language, these studies corroborate the view of language as a social tool and of language as an integral part of social perception.

*Keywords:* language, meta-semantic effects, verbs, agency, social judgment

## Verbs as Linguistic Markers of Agency - The Social Side of Grammar

"Yes, we can!" is the most famous political slogan of our times, a slogan that propelled many people into action in favor of the prospective president Barack Obama. Interestingly, it is the slogan employing the verb (i.e., "can") that became the benchmark of Obama's campaign in 2008 and not those that were used in parallel like "Change" or "Forward". Similarly, the brand Apple is mainly associated with verb-based slogans such as "Think Different", "Get a Mac" or "Switch" than with slogans without a verb-focus such as "The Power to Be Your Best". Why? In this article we argue that verbs (vs. adjectives and nouns) are a linguistic category that conveys information above and beyond the specific semantic content and that these *meta-semantic effects* influence people's cognitive processes (for a similar notion regarding non-referential and para-semantic effects of language see Fiedler, 2008). Specifically, we claim that verbs imply dynamic properties that other grammatical categories (nouns and adjectives) lack and that make them the preferred syntactic device to convey activity. By extension, we propose that verbs also convey agency, a basic dimension in human perception that is related to goal achievement and stereotypically associated with specific target groups such as men or young people (for an overview see Abele & Wojciszke, 2014). Even if the link between grammatical categories and agency has – to our knowledge – never been directly examined before, the existing literature yields preliminary support to the notion of a verb-agency link.

### Verbs: The Dynamic Grammatical Category

Up until now, the link between grammatical categories and social meaning was investigated primarily as regards the concreteness - abstractness dimension within the Linguistic Category Model (LCM, Semin & Fiedler, 1988) and its subsequent developments (Carnaghi, Maass, Gresta, Bianchi, Cadinu, & Arcuri, 2008). According to this theoretical

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3 perspective, linguistic categories differ in terms of the abstractness of the information they  
4 convey. Regarding verbs, the LCM distinguishes descriptive action verbs (DAV), which are  
5 the most concrete and refer to behavior in a specific situation (e.g., “he kicked the dog”),  
6 interpretative action verbs (IAV), which describe a larger class of behaviors (e.g., “he hurt  
7 the dog”), and the third and smallest verb class, namely state verbs (SV), which describe  
8 psychological states (e.g., “he hates the dog”)<sup>1</sup>. Adjectives (e.g., “he is an aggressive person”)  
9 and nouns (e.g., “he is an aggressor”) are more abstract than verbs and are mainly used to  
10 express general, dispositional judgments (Carnaghi et al., 2008; Gelman & Heyman, 1999;  
11 Walton & Banaji, 2004). Whereas nouns and adjectives represent relatively static, enduring  
12 qualities, verbs generally reveal dynamism. Moreover, the large majority of verbs  
13 (descriptive and interpretative action verbs) convey a sense of agency that is typically  
14 attributed to the subject of the sentence (Brown & Fish, 1983; Semin & Marsman, 1994).  
15 Thus, already within the LCM framework verbs are linked to activity and are seen to mostly  
16 denote actions and describe behaviors rather than dispositional traits, for which other  
17 grammatical categories become more distinctive.

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36 On a more basic level, the idea that different word classes are linked to different  
37 meanings also receives support from neuro-psychological research showing that prototypical  
38 words of different word categories (such as verbs vs. nouns) recruit partially distinct neural  
39 networks (Caramazza & Hillis, 1991; for a comprehensive overview of brain correlates of  
40 grammatical categories see Vigliocco, Vinson, Druks, Barber, & Cappa, 2011). However,  
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Vigliocco and colleagues (2011) noted that clear neural differences emerged particularly  
when studies used prototypical verbs (referring to activities) and prototypical nouns (referring  
to objects) - that is, when a confound between grammatical classes (verbs vs. nouns) and their  
prototypical meaning (action vs. object) was present. Yet, the observation that verbs  
prototypically coincide with activity is central to our argument here. Intriguingly, verbs also

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3 seem to prompt muscle activity more than other word classes. For instance, participants'  
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5 zygomatic major muscle was activated more strongly when they were exposed to the verb "to  
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7 smile" than to the adjective "funny" (Foroni & Semin, 2009; for a similar pattern of  
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9 embodied processing of action verbs see Willems, Hagoort, & Casasanto, 2010).

10  
11 Taken together, verbs, a basic grammatical category present in almost all languages  
12  
13 (Kroeger, 2005), are linguistic devices used to express actions and agency. The aim of the  
14  
15 present set of studies was to verify whether the verb-agency relationship extends to the social  
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17 realm by testing whether (a) verbs are the preferred word class when referring to agentic  
18  
19 groups and (b) whether perceivers correctly infer the agency tied to verbs.

### 20 21 22 **Agency: The Dynamic Dimension in Social Perception**

23  
24 The "big two", agency/competence and communion/warmth, have been identified as  
25  
26 the fundamental dimensions that guide social judgment of the self, other individuals, and  
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28 social groups (Abele, Cuddy, Judd, & Yzerbyt, 2008; Fiske, Cuddy, Glick, & Xu, 2002;  
29  
30 Ybarra, Chan, Park, Burnstein, Monin, & Stanik, 2008). By definition, communion reflects  
31  
32 "social acceptance and connection", whereas agency allows for the "pursuit of goals, given  
33  
34 available opportunities" (Abele, Cuddy, et al., 2008, p. 1063). Thus, agency (just like verbs)  
35  
36 can be considered as the dynamic component of the big two, with its focus on enacting and  
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38 striving.  
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43 The dynamic nature of agency is not only reflected in its content, but also in how the  
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45 construct is structurally represented in the semantic net. Recent research suggests that  
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47 communion forms a semantically dense concept (Bruckmüller & Abele, 2013; Fiske et al.,  
48  
49 2002), with closely clustered items (e.g., warm, sociable, gentle), whereas agency is  
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51 perceived as more varied, especially in its negative components (Bruckmüller & Abele, 2013;  
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53 Kenworthy & Tausch, 2008). Similarly, other research has found that judgments of people's  
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55 agency are easily changed (Abele, Rupperecht, & Wojciszke, 2008) depending on contextual  
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3 information, whereas situational changes in communion are rare (Uchrowski, Abele, &  
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5 Bruckmüller, 2013). At a larger scale, agentic components of stereotypes change more easily  
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7 than communal components (Twenge, 1997). The above-mentioned research suggests, that  
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9 agency not only semantically refers to activity, but it also represents a more dynamic  
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11 construct and is more influenced by contextual cues, whereas communion is a more stable  
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13 and static construct. We here further extend the definition of agency, by showing that not  
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15 only the content, not only the semantic structure, but also the syntactic choices contribute to  
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17 its expression.  
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21 Although all of the aforementioned lines of work suggest a link between the  
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23 grammatical category of verbs and the social dimension of agency, this link has not been  
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25 examined directly so far. In fact, the semantic connotations of agency (vs. communion) have  
26  
27 mostly been examined in reference to adjectives (Abele & Wojciszke, 2007, 2014;  
28  
29 Bruckmüller & Abele, 2013). We will argue here that agency is better reflected in verbs than  
30  
31 in adjectives and nouns and that agency concerns "doing actions" more than "being active".  
32  
33 Our core argument is that agency is reflected in verbs rather than in adjectives and nouns.  
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### 36 37 **The Present Research**

38  
39 In this article, we address a novel aspect of linguistic categories by linking verbs to the  
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41 basic dimension of agency. The general idea is that verbs are distinctly associated with  
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43 agency and that this link is visible both in language production and in inferences drawn from  
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45 language.  
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48 Not only the specific verb-agency link is novel, but also its meta-semantic nature. We  
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50 propose that grammatical categories per se are able to convey social meaning. This broad  
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52 claim calls for tailored research approaches. Until now, only real words have been used in  
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54 studies examining the role of linguistic categories in social psychology. However, in this case  
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56 the meaning conveyed by the words' semantics is inevitably involved in the processing of the  
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3 grammatical categories. This is to some degree even true when words share the same stem,  
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5 but differ in grammatical category (e.g., to act, active, actor/activist; to play, playful, player).  
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7 Even in this case, meaning may change from one grammatical category to another, creating a  
8  
9 natural confound between the meaning conveyed by the grammatical form and by the  
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11 semantic of the word. Moreover, there are large frequency differences with which these  
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13 words are used (as reflected in linguistic corpora, an issue we will return to in the general  
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15 discussion). To avoid potential confounds due to semantics and to approximate the idea of  
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17 meta-semantic effects, we employed two complementary methods here: a) a corpora analysis  
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19 that investigates word classes irrespective of their meaning in real language use and b) a  
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21 pseudo words paradigm that excludes the involvement of any semantic content.  
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26 Accordingly, we tested the verb-agency link in two sets of studies. First, we wanted to  
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28 demonstrate the relationship between verbs and agency in actual language use. We therefore  
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30 decided to turn to existing corpora and test for co-occurrences of verbs with agentic and non-  
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32 agentic social targets (Study 1). The idea of a verb-agency link for social groups irrespective  
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34 of the verbs' meaning was tested in a series of archival corpora analyses conducted in Polish  
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36 and German. Since prior research has shown that men are perceived as more agentic than  
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38 women (e.g., Diekmann & Eagly, 2000; Eagly & Karau, 2002) and young people as more  
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40 agentic than old people (e.g., Cuddy, Fiske, & Glick, 2008), we focused on these two pairs of  
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42 targets. We hypothesized that social targets associated with agency (i.e., men and the young)  
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44 would be more likely linked with verbs than non-agentic targets (i.e., women and the  
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46 elderly).  
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50 Second, we focused on the interpretation of language employing a pseudo-word  
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52 paradigm. We predicted that verbs (but not adjectives and nouns) are interpreted as signaling  
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54 agency. That is, people ascribe more agency to verbs than adjectives and nouns even when  
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56 the semantic content is held constant. This hypothesis was tested in three experiments  
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3 conducted in Polish using a pseudo-word paradigm. Pseudo-words with the same word stem  
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5 and a suffix unequivocally assigning the word to the grammatical category of verbs (e.g., to  
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7 lann), adjectives (e.g., lannitive), or nouns (e.g., lanniness) allowed us to investigate whether  
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9 grammatical categories per se convey social meaning.  
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11  
12 In all experiments (Study 2 to 4), participants evaluated the degree to which such  
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14 pseudo-verbs, -adjectives, and -nouns transmit a sense of agency. In addition to the focal  
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16 agency dimension, we also assessed inferences about communion, the second “big two”  
17  
18 dimension, to demonstrate discriminant validity. Based on the proposed meta-semantic verb-  
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20 activity link, we hypothesized that, in contrast to adjectives and nouns, verbs would be  
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22 associated with agency, but not communion. In Study 3 and 4, we further assessed potential  
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24 correlates of pseudo words already investigated in prior research on the big two and/or on  
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26 language abstraction: namely, valence (Suitner & Maass, 2008) and abstractness (Semin &  
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28 Fiedler, 1988). Given that we used pseudo words free of semantic content, we did not make  
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30 predictions about inferences regarding valence or abstraction. Our main aim was to show that  
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32 the verb-agency link will explain unique variance even when controlling for perceived  
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34 abstractness and valence. Thus, whereas the first (corpora) study focuses on language  
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36 production, the latter (experimental) studies investigate the interpretation of words belonging  
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38 to different word classes and shall establish the distinctness of the verb-agency link.  
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### 43 Study 1

44  
45 Are verbs actually *used* to express agency in spontaneous language production? To  
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47 answer this question we investigated the verb-agency link in spontaneous language use with  
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49 reference to stereotyped groups. We hypothesized that targets stereotypically characterized  
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51 by high agency (men and young people) are more likely associated with verbs than groups  
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53 characterized by low agency (women and old people).  
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### 56 General Method

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3           The agency-target association should be strongest, when the target (and not the object)  
4 is mentioned as the agent in the sentence (Fausey & Boroditsky, 2010; Fausey, Long,  
5 Inamori, & Boroditsky, 2010). In exemplary studies (Fausey & Boroditsky, 2010; Fausey, et  
6 al., 2010), when the logical agents occurred in the role of the subject and were, thus, paired  
7 with the verb (i.e., “he broke the vase”), they were ascribed more responsibility and higher  
8 financial fines than when the same event was presented without the crucial agent-verb pairing  
9 (“the vase broke”). Following this logic, we investigated instances where the target of interest  
10 (stereotypically agentic vs. not) was more often linked with a verb.  
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13  
14           Moreover, the target-verb order should enhance the agency-target association in  
15 subject-verb-object languages such as Polish and also possibly in languages without  
16 dominant word order such as German (Bettinsoli, Maass, Kashima, & Suitner, 2015).  
17 Therefore, we compared instances of verbs directly following agentic versus non-agentic  
18 targets. These sentence structures should be most common and most effective in  
19 (differentially) conveying agency, which allowed us to test our hypothesis while keeping the  
20 grammatical structure constant. In the corpora analyses, we assessed: (1) the overall  
21 occurrence of the target words (to assess base rates) and (2) the frequency of the target words  
22 representing high versus low agency immediately followed by a verb (e.g., a search  
23 command for “men [*verb*]” instances). To set restrictive criteria for the verbs, we excluded  
24 word forms of the most common auxiliary and linking words “to have” and “to be” (cf. LCM  
25 coding manual, Coenen, Hedeboew, & Semin, 2006) from the analyses (but the results  
26 remain robust when including them<sup>2</sup>). The study composition is summarized in Table 1.  
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50           ---- please insert Table 1 about here ----  
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52           We recorded the number of occurrences of target-verb collocations in reference to the  
53 total number of target word occurrences for all search targets. For Polish, we used the Polish  
54 National Corpus (Peżik, 2012; <http://www.nkjp.uni.lodz.pl>). This corpus comprises a  
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representative sample of language use, consisting of input from books (29%), press (50%), other written data (4%), internet (7%), and spoken language (10%). For German, we used the archive Tagged-C of the German Reference Corpus DeReKo (Kupietz, Belica, Keibel, & Witt, 2010), which comprises over 6.47 million texts of 26 German corpora with ca. 96% of the texts stemming from newspaper and press texts and another 3% stemming from the internet (for a list of all corpora, cf. <http://www.ids-mannheim.de/cosmas2/projekt/referenz/korpora.html>)<sup>3</sup>.

## Results

The results shown in the upper section of Table 2 indicate that in Polish, the co-occurrence of the target group "men" followed by verbs is 1.38 more likely than the co-occurrence of "women" and verbs (Odds Ratio = 1.45, 95%CI = [1.41; 1.49];  $\phi = 0.06$ ). In German, this pattern is replicated, with "men" in collocation with verbs being 1.14 more likely than "women" in collocation with verbs (Odds Ratio = 1.17, 95%CI = [1.16; 1.18];  $\phi = 0.03$ ).

For age, in Polish, the co-occurrence of the target group "young people" and verbs is 2.89 more likely than that of "old people" and verbs (Odds Ratio = 3.27, 95%CI = [2.73; 3.92];  $\phi = 0.09$ ). In German, this pattern is replicated, with "young people" in collocation with verbs being 1.19 more likely than "old people" in collocation with verbs (Odds Ratio = 1.22, 95%CI = [1.19; 1.25];  $\phi = 0.03$ ).

---- please insert Table 2 about here ----

## Discussion

The corpora analyses attest to a verb-agency link in real language use: Stereotypically agentic targets (i.e., men and young people) were more likely followed by verbs than non-agentic targets (i.e., women and old people). This study provides consistent evidence for a natural link between target agency and verbs in language production across a variety of

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3 domains – and irrespective of the verbs’ meaning. Whether the producers of these  
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5 innumerable instances of language chose their expressions strategically to depict agentic  
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7 targets as agents and as being active, or whether they did so unintentionally, remains elusive  
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9 at this point. For communicative functions, however, audiences must be able to detect the  
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11 agency hidden in verbs (vs. adjectives and nouns). Are recipients able to interpret verbs in  
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13 line with the (presumed) communicative intentions of the communicator? To investigate this  
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15 question we conducted three experimental studies.  
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### 18 **Experimental Pseudo-Words Paradigm**

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20 Studies 2 to 4 were designed to test whether verbs are ascribed more agency than other  
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22 linguistic categories. In order to examine how grammatical categories per se are related to  
23  
24 social meaning, we aimed at “switching off” the semantic content. To do so, we relied on  
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26 pseudo-words tailored to the Polish language. We relied on Polish for these experiments,  
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28 because it is possible to indicate the grammatical gender unequivocally solely based on the  
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30 word’s suffix in this language. Manipulating grammatical gender would have been more  
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32 complex in English and German for instance (e.g., due to the necessity to add the indefinite  
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34 marker “to” in English for a verb, such as in “to marn” or deal with capital letters and more  
35  
36 ambiguous endings in German).  
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40 We hypothesized that pseudo-verbs would convey more agency than pseudo-adjectives  
41  
42 and pseudo-nouns. This effect of grammatical categories should be specific for the dimension  
43  
44 of agency and it should not hold for communion judgments.  
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46

### 47 **General Method<sup>4</sup>**

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49 In all three experiments, participants evaluated a list of pseudo words that comprised  
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51 the same number of pseudo-verbs, adjectives, and nouns (five in Study 2 and three in Studies  
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53 3 and 4, respectively). Pseudo-word sets were selected based on careful pretesting that  
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55 assured pronounceableness and meaninglessness across the three linguistic categories. To  
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3 create the pseudo-word stems, a formula in Excel randomly generated phonemes to construe  
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5 two-syllable word stems consisting of two C-V-C syllables, where C means consonant and V  
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7 means vowel. This syllable configuration is among the most frequent in Polish (Śledziński,  
8  
9 2010). The 360 created word stems were screened to fulfill the following criteria: (1) possible  
10  
11 pronunciation and orthography, (2) meaninglessness, (3) comprising biphonemes and  
12  
13 triphonemes in Polish language (Śledziński, 2010). In the next step, suffixes were added  
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15 indicating either the infinitive of the verb (-ić, -ować, -yczyć), the nominative of the adjective  
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17 (-ne, -kie etc.), or the suffix for nouns conveying a sense of abstractness (-stwo being typical  
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19 for words like manhood – Study 2 and 3) or suffixes of common nouns (Study 4). These  
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21 variants were again screened to assure ease of pronunciation, orthographic compatibility, and  
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23 absence of meaning.  
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28 The final list of 36 pseudo-word sets was pretested among a group of 26 native Polish  
29  
30 speakers. Participants were randomly assigned to three groups differing in the order of  
31  
32 presented stimuli (starting either with verb, adjective, or noun with word stems in a same  
33  
34 fixed random order). Participants were presented with each of the 36 word stems only once –  
35  
36 either in the form of a verb, adjective, or noun (i.e., each participant viewed twelve verbs,  
37  
38 adjectives, and nouns in total). Participants indicated whether they perceived the presented  
39  
40 words as nonsensical (1 = *does not at all remind of an existing word* to 6 = *reminds very*  
41  
42 *much of an existing word*). Based on these results, fifteen pseudo-word sets were selected so  
43  
44 that: (a) they were rated similarly in their nonsensicality across the three linguistic categories  
45  
46 ( $ps > .05$ ) and (b) they were significantly different from the midpoint of the scale (3.5,  $ps <$   
47  
48  $.05$ ) in the direction of nonsensicality. The stimuli used in Studies 2 and 3 are presented in the  
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50 upper part and for Study 4, with partially changed suffixes, in the lower part of Table 3.  
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54 ----- please insert Table 3 about here -----  
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3 All studies had a within-subject design with participants evaluating all types of  
4 grammatical categories. To control for the within-participant variance in the judgments of  
5 grammatical categories, we analyzed the data using a multilevel framework, with words  
6 nested within participants. Analyses were conducted with Mplus 7 (Muthén & Muthén,  
7 1998–2012) and the Maximum Likelihood Robust estimator was used in all analyses.  
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## 14 Study 2

### 15 Method

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18 **Participants.** Sixty students of mathematics of Warsaw University participated (31  
19 women,  $M_{Age} = 22.23$  years,  $SD_{Age} = 6.24$  years).  
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22

23 **Procedure.** For the paper-pencil task, we used the 15 pseudo-word sets obtained from  
24 the pretest. Pseudo-words were presented in a fixed random order and participants evaluated  
25 lists consisting of 15 stimuli (5 verbs, 5 adjectives, 5 nouns). Three lists were created, each  
26 starting with the same word stem but a different suffix (i.e., a different grammatical  
27 category). The instruction read as follows: "This 5 minute study investigates how meaning is  
28 construed in language based on artificial grammar. Please evaluate the following 15 artificial  
29 words. As the words are nonexistent, please rely on your intuition. Please try not to think for  
30 too long, rather rely on your first impression." Before participants rated the words, they were  
31 asked to classify them according to their grammatical category (adjectives, nouns, verbs,  
32 other). Overall, 91.56% of the classifications were correct, which is similar to the number of  
33 correct classification in the LCM (Semin & Fiedler, 1988). Finally, participants were  
34 instructed to perform a forced choice selecting which of the two content domains, agency or  
35 communion, each word matched (with descriptions adapted from Abele & Wojciszke, 2007;  
36 Abele, Uchrowski, Suitner, & Wojciszke, 2008):  
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38 A - Agency was introduced as an "orientation toward actions and being efficient. It is about  
39 striving to achieve goals." As examples, real words denoting agency were provided,  
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3 including two nouns (activity, success), two adjectives (ambitious, diligent), and two verbs  
4  
5 (strive, achieve)<sup>5</sup>.

6  
7 C - Communion was introduced as an "orientation toward others and focusing on relations  
8  
9 with other people." As examples, real words denoting communion were provided, including  
10  
11 two nouns (friendship, politeness), two adjectives (warm, tolerant) and two verbs (help,  
12  
13 support).

14  
15  
16 The order of the agency and communion descriptions was counterbalanced. The  
17  
18 pseudo-words were presented in a booklet, with each word presented separately on a piece of  
19  
20 paper. Beside each word, there were two letters A or C standing for agency and communion  
21  
22 respectively. The order of the letters matched the order of the instructions.

## 23 24 25 **Results and Discussion**

26  
27 To determine if grammatical category predicted whether participants perceived the  
28  
29 word either as agentic (value 1) or communal (value 0), analyses were run with the  
30  
31 grammatical category as a within-participants predictor. Random intercepts were estimated.  
32  
33 Two orthogonal contrasts were created. In the first one, verbs (coded as 2) were compared to  
34  
35 the two other categories (both coded as -1). In the second contrast, adjectives (1) were  
36  
37 compared to nouns (-1). The means for all three experiments are presented in Table 4. A  
38  
39 saturated model was estimated in which the two contrasts were used to predict the agency-  
40  
41 communion ratings at the within participants level; at the between level, only the random  
42  
43 intercept was estimated. The results of this model are shown in the Table 5. As predicted, the  
44  
45 log odds of choosing agency over communion were higher for verbs versus the other  
46  
47 categories ( $B = 0.16$ ;  $SE = 0.06$ ;  $p < .01$ ; Odds Ratio = 1.17). There was no difference  
48  
49 between adjectives and nouns in the ascription of agency versus communion ( $B = -0.05$ ;  $SE$   
50  
51  $= 0.09$ ;  $p = .59$ ; Odds Ratio = 0.95).<sup>6</sup>

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56 ---- please insert Table 4 and 5 about here ----  
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3 This pattern lends first support to our claim that verbs uniquely carry agency  
4 information, which is extracted by perceivers. However, this study has a number of  
5 limitations. First of all, participants had to make forced-choice decisions regarding agency-  
6 communion. This dependent variable does not take into consideration that agency and  
7 communion are in fact two dimensions and that a word may be perceived as agentic and  
8 communal at the same time. This issue was addressed in the subsequent studies. Furthermore,  
9 prior to judgments of agency and communion, participants had to classify words according to  
10 their grammatical category (adjectives, nouns, verbs, other) and this task could have primed  
11 them into looking for an overlap between the grammatical classification and the consecutive  
12 rating task. As this might have biased the results, the classification task was presented after  
13 the evaluation of the words in the following studies.

### 27 Study 3

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29 In Study 3, we assessed agency and communion as separate dimensions to  
30 substantiate the present findings.

#### 33 Method

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36 **Participants.** One hundred and four students participated in the study (13 men, 58  
37 women, 33 people did not provide information on their gender;  $M_{Age} = 21.03$  years,  $SD_{Age} =$   
38 0.83 years).

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43 **Procedure.** Given that participants had to rate the words on several dimensions, we  
44 reduced the pseudo-word sets to nine word stems. Pseudo-words were selected from the  
45 pretest with the same criteria as in Study 2 and set in a fixed random order. Participants  
46 evaluated paper-pencil lists consisting of nine stimuli (3 verbs, 3 adjectives, 3 nouns). Three  
47 lists were created, each starting with the same word stem but with a different suffix, and the  
48 instruction resembled that provided in Study 2. This time, agency and communion were  
49 assessed using two Likert scales rather than a forced-choice format ( $-5 = opposite\ of$   
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3 *agency/communion* to 5 = *perfect example of agency/communion*, cf. Abele & Wojciszke,  
4  
5 2007). As in Study 2, examples of agency and communion were provided. Moreover,  
6  
7 participants evaluated the valence and the concreteness-abstractness of words on two scales (-  
8  
9 5 = *negative/concrete* to 5 = *positive/abstract*). The instruction regarding the latter dimension  
10  
11 read as follows: "Concrete words denote things that exist in reality and it is easy to picture  
12  
13 them; abstract words rather reflect thoughts and ideas and do not have physical  
14  
15 representations." Examples of concrete words were "shoe," "green," and "to kick," and of  
16  
17 abstract words "friendship," "spiritual," and "to contemplate." (cf. Brysbaert, Warriner,  
18  
19 Kuperman, 2014, for a similar operationalization). Participants received the words in a  
20  
21 booklet. Each word was presented at the top of a page followed by the evaluation of the four  
22  
23 dimensions in the order: agency and communion (counterbalanced), abstractness, and  
24  
25 valence. Finally, participants reported, for each pseudo-word, the extent to which it reminded  
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27 them of the real grammatical category (e.g., verbs for pseudo verbs etc.) on a scale -5 *not at*  
28  
29 *all* to 5 *very much*. All three grammatical categories were recognized correctly (verbs:  $M =$   
30  
31 2.90,  $SD = 2.43$ ; adjectives:  $M = 1.72$ ,  $SD = 2.50$ ; and nouns:  $M = 2.03$ ,  $SD = 2.47$ ), as  
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33 indicated by a significant difference from 0, representing the midpoint of the scale (all  $ps <$   
34  
35  $.001$ )<sup>7</sup>.

## 40 Results and Discussion

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42 Two orthogonal contrasts were created. In the first one, verbs (coded as 2) were  
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44 compared to the other two categories (both coded as -1). In the second contrast, adjectives (1)  
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46 were compared to nouns (-1). The conceptual model that was tested is presented on Figure 1.  
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48

49 ---- please insert Figure 1 about here ----

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51 At first, we evaluated a saturated model. Second, we defined additional constraints to test the  
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53 hypothesis of a unique verb-agency link. The constraints were as follows: (a) We set the path  
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55 from Contrast 2 (comparing adjectives and nouns) to the evaluation of agency to zero as we  
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3 have not hypothesized any difference between these two categories; (b), we set the  
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5 coefficients for both contrasts to 0 in reference to communion judgments as we have not  
6  
7 hypothesized any relevance of the grammatical categories to the communion dimension.<sup>8</sup>  
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9  
10 The results of the saturated and the constrained models are shown in Table 6. The  
11  
12 obtained results are congruent with the hypothesized relationships. Verbs led to higher  
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14 agency perceptions than nouns and adjectives. Moreover, grammatical categories were  
15  
16 unrelated to the communion judgments. Taken together, these analyses replicate the results of  
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18 Study 2. Extending these findings, it is evident that perceived abstractness of words was  
19  
20 negatively related to the judgment of agency, meaning that the more abstract the word was  
21  
22 perceived, the less it was perceived as agentic.  
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25 However, it is noteworthy that the nouns used as stimuli in this study were biased  
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27 toward abstractness due to their suffix (reserved for abstract words). To correct for this fact  
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29 and to test the robustness of our findings, in Study 4, we used suffixes common to broader  
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31 classes of nouns (i.e., nouns in general with a feminine vs. masculine vs. neutral grammatical  
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33 gender).  
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36 ---- please insert Table 6 about here ----  
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#### 38 Study 4

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40 This study was a replication of Study 3 conducted to substantiate the findings  
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42 obtained in the previous experiments. Moreover, new stimuli were used for the grammatical  
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44 comparison group of nouns and we also varied also the grammatical gender of the adjectives.  
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#### 47 Method

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49 **Participants.** One hundred and twenty three students participated (58 men, 65  
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51 women,  $M_{Age} = 20.41$  years,  $SD_{Age} = 2.44$  years).  
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53  
54 **Procedure.** There were two differences between Study 3 and 4 regarding the  
55  
56 experimental procedure. The first difference was the earlier described change in the stimuli  
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(suffixes for common nouns instead of abstract nouns). The second difference was that participants classified words in terms of their grammatical class as in Study 2 (decision between grammatical categories instead of continuous ratings) but at the end of the experiment (as in Study 3) – 83.92% of the words were classified correctly.

## Results and Discussion

Two orthogonal contrasts were created. In the first one, verbs (coded as 2) were compared to the two other categories (both coded as -1). In the second contrast, adjectives (1) were compared to nouns (-1). The conceptual model that was tested is presented in Figure 1 (i.e., it is the same as in Study 3). At first, we evaluated the saturated model. Second, we defined additional constraints in the model to test the hypothesis of a unique verb-agency link. The constraints were as follows: (a) We set the path from Contrast 2 (comparing adjectives and nouns) to the evaluation of agency to zero as we have not hypothesized any difference between the two categories; (b) we set the coefficients for both contrasts to 0 in reference to communion judgments as we have not hypothesized any relevance of the grammatical categories to the communion dimension. The results of the saturated and the constrained models are shown in the Table 6. Again, the obtained results are congruent with the hypothesized relationships. Verbs led to higher agency ascriptions than nouns and adjectives. Moreover, grammatical categories were unrelated to the communion judgments<sup>9</sup>. The correlation between abstractness and agency found in Study 3 was not evident now that the suffix of nouns was no longer confounded with abstractness.

## General Discussion

To our knowledge, this is the first set of studies to show that social judgments are related to meta-semantic characteristics of language. Specifically, the present studies provide the primary empirical evidence that verbs (but not adjectives or nouns) are associated with agency. This verb-agency link is corroborated with evidence from (a) natural language use

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3 and (b) the interpretation of language in controlled experiments. In actual language use as  
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5 investigated with large-scale corpora analyses, stereotypically agentic social targets were  
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7 more likely paired with verbs than non-agentic social targets (Study 1). Importantly, this  
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9 pattern emerged for two languages belonging to different language families, Polish being a  
10  
11 Slavic and German a Germanic language. Moreover, agency was specifically conveyed by  
12  
13 verbs in the experiments with pseudo-words (Studies 2 to 4) and this effect was stable even  
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15 when controlling for valence and perceived abstraction. The absence of systematic  
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17 grammatical category effects on communion, generally considered the second fundamental  
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19 dimension of social judgment, further attests to the specificity of the verb-agency link. Taken  
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21 together, this evidence suggests a strong link between agency and the grammatical category  
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23 of verbs, both in language production and in the construction of meaning from language.  
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28 From a methodological viewpoint, we would like to highlight that the findings from  
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30 the corpora analyses (maximizing ecological validity) and from the pseudo-word studies  
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32 (maximizing experimental control) converge. In particular, the pseudo-word paradigm  
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34 employed in the three experimental studies has the great advantage that word class and  
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36 meaning are not confounded, a problem that limits the validity of many studies on neural  
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38 correlates of word classes (see Vigliocco et al., 2011, for an overview), as well as most LCM  
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40 studies.  
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44 The verb-agency link fills another blank in the language-cognition puzzle and may  
45  
46 inform future basic research on the meta-semantic properties of grammatical categories.  
47  
48 Specifically, the relationship of the concreteness of verbs (as implied by the LCM) and their  
49  
50 association to agency should be investigated to consolidate the present approach with the  
51  
52 LCM in a more concise way. Importantly, the rationale and results of our studies are  
53  
54 complementary to the LCM account. Our own approach, distinguishing verbs from other  
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56 grammatical categories, overlaps only partially with the more fine-grained LCM model.  
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3 Within the LCM framework, state verbs seem to be a possible exception to the verb-agency  
4 link proposed here. Such verbs mostly refer to subjects' emotional (and potentially enduring)  
5 states rather than to actions and agency (Brown & Fish, 1983; Semin, 2000). Hence, they  
6 differ from other verb types mainly on semantic grounds, which go beyond the scope of the  
7 present research with its focus on meta-semantic effects. Compared to more common verb  
8 types, state verbs only constitute a small proportion of verbs and, possibly for this reason,  
9 Vigliocco et al. (2011) claim that prototypical verbs refer to actions. Based on learning  
10 theories it is reasonable to assume that such prototypical, well-learned associations drive  
11 meta-semantic effects. We used this notion in the pseudo-word studies and assumed that,  
12 when encountering pseudo-verbs, participants would refer to the central representatives of  
13 this grammatical category. This notion is supported empirically in our studies, where  
14 participants exposed to pseudo-words attributed more agency to verbs than to the other  
15 grammatical categories. Thus, they most likely relied on prototypical associations, while  
16 ignoring atypical instances such as state verbs. However, the interplay between grammatical  
17 categories, agency and concreteness vs. abstractness should be investigated systematically in  
18 the future.

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21 Furthermore, potential lies in investigating the generalizability of the verb-agency link  
22 in other realms. The likelihood of verbs to evoke agentic associations may be mainly relevant  
23 in the social domain regarding the perception of individuals and groups, because it is  
24 precisely the context of social judgment where agency has proven to be an important  
25 coordinate in previous research. Within social judgment, people described by verbs (or  
26 describing themselves in this way) might be perceived as more agentic than those addressed  
27 with adjectives or nouns. These implications should be tested in future studies.

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3 Outside the social judgment domain, agency may be less relevant. For instance, when  
4 inferring the importance of an attitude to one's identity, grammatical categories may play a  
5 role primarily on the basis of their temporal qualities. In fact, in a set of studies on behavioral  
6 effects, people were found to be more affected by nouns than by verbs when their  
7 membership in socially desirable categories was at stake (Bryan, Adams, & Monin, 2012;  
8 Bryan, Walton, Rogers, & Dweck, 2011): People registered as voters were more likely to  
9 vote when questions probing their attitude in that matter were formed in a noun form "How  
10 important is it to you to be a voter in the upcoming election?" rather than a verb form "How  
11 important is it to you to vote in the upcoming election?" (Bryan et al., 2011, p. 12653).  
12  
13 Similarly, those reminded not to be cheaters were less likely to cheat than those who were  
14 asked not to cheat (Bryan et al., 2012). Nonetheless, it may still be true that the description  
15 "Person X voted" is perceived as more agentic than the description "Person X was a voter"  
16 (i.e., a matter of social judgment). However, the comparison of nouns and verbs having the  
17 same word stem may be problematic in this case given that the noun is an agent noun formed  
18 from the verb and denotes a person doing this action (e.g., the word "eater" is derived from  
19 the verb "to eat"). In the case of "agent nouns", one could hypothesize that the agency  
20 transfers from the verb to the noun (cf. also Vigliocco et al., 2011). Moreover, such nouns  
21 appear to be much less frequent than the respective verbs. In Table 7, we present the corpora  
22 frequencies of a sample of agent nouns and accompanying verbs that were used in previous  
23 studies (Bryan et al., 2012; Bryan et al., 2011) that attest to this possibility (upper section of  
24 Table 7). As a contrast, we also present a random sample of verbs and nouns from the  
25 comprehensive list of English lemmas (Brysbaert, Warriner, & Kuperman, 2014) in which a  
26 word can be used either as a verb ("to comb") or a noun ("a comb") in the lower section of  
27 Table 7. In case of the former set, nouns consistently evidenced lower frequencies than the  
28 associated verbs, which was not true for the random sample in the second set. This highlights  
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3 the uniqueness of “agent nouns” - Encountering them may make people think that they are  
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5 used for a reason: for instance, to highlight the stability of the involved activity (which would  
6  
7 likely trigger more attributions of agency). Naturally, people try to make sense of their world  
8  
9 and pay close attention to inconsistencies. Moreover, frequency is known to influence the  
10  
11 fluency of information processing and its consequences (e.g., Oppenheimer & Frank, 2008).  
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13 Therefore, we consider the frequency issue a possible confound in making inferences about  
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15 grammatical categories of real words that may also help reconcile the present findings with  
16  
17 previous work.  
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21 On the background of these considerations, we had opted for artificial words for which  
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23 the concerns about differences of frequencies of usage or semantics are not relevant (Studies  
24  
25 2 to 4) – next to the “all verbs” approach in the corpora analyses (Study 1). While we  
26  
27 recognize that semantics and salience will guide the social perceiver, we would like to add  
28  
29 that meta-semantic effects, such as the verb-agency link, may contribute to the sense-making  
30  
31 process in a very subtle way, with the specific venues still to be investigated – a journey we  
32  
33 are looking forward to take.  
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38 ---- please insert Table 7 about here ----  
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## 40 Conclusion

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42 Verbs express action. This functional property emerges as the first mentioned feature  
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44 in many definitions of this class of words. For example, according to the Collins English  
45  
46 Dictionary, a verb is “any of a large class of words in a language that serve to indicate the  
47  
48 occurrence or performance of an action [...]”. According to Random House Kernerman  
49  
50 Webster’s College Dictionary, verb is defined as “a member of a class of words that function  
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52 as the main elements of predicates, typically express action [...]”. We here show that this  
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54 property goes beyond grammar, intruding in cognition, and by extension in social cognition.  
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3 The well-established relation between language use and cognition (Semin, 1998) foresees  
4 that the linguistic properties shape and constrain the cognitive processing of the information  
5 conveyed by the linguistic devices we use and this has important implications in the social  
6 realm (Holtgraves & Kashima, 2008). For example, previous studies showed that choosing  
7 the first person pronoun moves our attention to the self (Chung & Pennebaker, 2007), or that  
8 dropping the pronoun moves the attention away from the target performing the action  
9 (Kashima & Kashima, 1998). Interestingly, in many cases the relation between language and  
10 cognition is saturated and explained by the semantic properties of the linguistic devices under  
11 scrutiny. In the previous example, the first person pronoun (I, me) semantically expresses the  
12 concept of self, and this conceptual priming by the words' semantics/meaning is critical for  
13 the effect. The LCM (and its extensions) offers a different perspective that categorizes  
14 language also according to structural properties (at least in the main difference between  
15 adjectives and verbs). However, the concrete implementation of the studies never fully  
16 disentangled the semantic and the structural aspects. For example, being an athlete versus  
17 being athletic (Carnaghi et al., 2008, Study 1) is grammatically different (noun vs. adjective),  
18 but it is also semantically different. Therefore, previous studies typically confirm that specific  
19 language devices (e.g., nouns) are used to express specific types of information (e.g.,  
20 enduring characteristics), but it was unclear whether this use reflects the meaning of the word  
21 or the very nature of the language device per se, such that choosing a specific linguistic  
22 device conveys the corresponding information even in a context in which previous  
23 knowledge cannot contribute to meaning construction. The pseudo-word paradigm was  
24 designed to test the pure contribution of the grammar class, without any further influence  
25 embedded in previous knowledge, related to the semantics of the words or to the familiarity  
26 due to use-frequency. Although the present studies had the main goal to show that the  
27 grammatical class of verbs is cognitively associated to agency, they also inform about a  
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3 general meta-semantic effect of grammar. We eventually own literacy about the meaning of  
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5 word classes that is independent from the specific semantic content of the single words.  
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7 Moreover, we use this literacy both in natural production (Study 1) and during information  
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9 processing when no other information is present (Study 2, 3, 4). Therefore, meaning is not  
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11 solely conveyed by semantics, but syntax has a critical role as well. Importantly, the meta-  
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13 semantic feature of grammar extends to the social level: We appear to subtly discriminate  
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15 social targets and we enforce the social stereotype describing them through the consistent use  
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17 of grammatical classes by associating stereotypically agentic social groups to the  
18  
19 grammatical class that better expresses agency, namely verbs.  
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23 In sum, the present studies offer consistent evidence that basic grammatical categories  
24  
25 influence social perceptions and that people use these grammatical categories as a tool for  
26  
27 their expressions. The power of language stems from its pervasiveness and subtlety, which  
28  
29 make it difficult to control, both in usage and perception. Investigating the verb-agency link  
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31 within the language and social judgment domain may have important implications for  
32  
33 communication in the social, legal, or political domain. Returning to our opening example,  
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35 our results suggest that President Obama was right in adopting the slogan “yes, we can”  
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37 rather than opting for an adjectival or nominal equivalent. By the same logic, one may  
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39 suspect and observe that the recently founded Spanish party *Podemos* (span. “we can”) will  
40  
41 be more successful than the equivalent Italian movement called *Possibile* (ital. “possible”).  
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43 Our results suggest that Obama’s verb slogan and the party label *Podemos* convey the agency  
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45 required to introduce the proposed change.  
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Table 1

*Summary of Target Stimuli Used in Study 1 - Corpora Search with English Translations*

Target group	Language	Agentic search targets	Non agentic search targets
Gender		Men, Man	Women, Woman
	Polish	"Mężczyźni," "Mężczyzna"	"Kobiety," "Kobieta"
	German	"Männer," "Mann"	"Frauen," "Frau"
Age		Young People	Old people
	Polish	"Młodzi ludzie," "Młodzież"	"Starzy ludzie," "Emeryci"
	German	"Junge Menschen," "Junge Leute," "Jugendliche"	"Alte Menschen," "Alte Leute," "Senioren"

Table 2

*Summary of Corpora Search Results (Study 1)*

			Total	With Verbs	Proportion	Odds
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Gender						
	Men		67,460	10,684	0.158	0.188
Polish	Women		94,594	10,882	0.115	0.130
	$\chi^2(1) = 641.01, p < .001$					
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	Men		518,321	85,305	0.165	0.197
German	Women		675,018	97,326	0.144	0.168
	$\chi^2(1) = 941.01, p < .001$					
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Age						
	Young people		20,592	3,495	0.170	0.204
Polish	Old people		2,228	131	0.059	0.062
	$\chi^2(1) = 185.11, p < .001$					
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	Young people		176,400	26,770	0.152	0.179
German	Old people		86,519	11,081	0.128	0.147
	$\chi^2(1) = 264.15, p < .001$					

*Note.* Total = frequency of target words (A); With Verbs = frequency of target words immediately followed by a verb (B); Proportion=B/A; Odds=B/(A-B).

Table 3

List of Stimuli Used in the Experiments (GC Indicates Grammatical Category of v- Verbs, a- Adjectives, n- Nouns)

	List 1	GC	List 2	GC	List 3	GC	
Stimuli lists for Study 2 and 3 (in bold)	<b>nefkiczyc</b>	<b>v</b>	<b>nefkickie</b>	<b>a</b>	<b>nefkistwo</b>	<b>n</b>	
	<b>szopfute</b>	<b>a</b>	<b>szopfustwo</b>	<b>n</b>	<b>szopfic</b>	<b>v</b>	
	bultestwo	n	bultewic	v	bultewne	a	
	leszdic	v	leszdune	a	leszdustwo	n	
	beklowne	a	beklostwo	n	beklowac	v	
	kechnystwo	n	kechnowac	v	kechnyckie	a	
	<b>dyzmuwac</b>	<b>v</b>	<b>dyzmuwskie</b>	<b>a</b>	<b>dyzmustwo</b>	<b>n</b>	
	<b>chynfowskie</b>	<b>a</b>	<b>chynfostwo</b>	<b>n</b>	<b>chynfowac</b>	<b>v</b>	
	<b>tyzjastwo</b>	<b>n</b>	<b>tyzjowac</b>	<b>v</b>	<b>tyzjawskie</b>	<b>a</b>	
	<b>fumzic</b>	<b>v</b>	<b>fumzięte</b>	<b>a</b>	<b>fumziestwo</b>	<b>n</b>	
	<b>nytczackie</b>	<b>a</b>	<b>nytczastwo</b>	<b>n</b>	<b>nytczowac</b>	<b>v</b>	
	rećwustwo	n	rećwic	v	rećwute	a	
	<b>jużbować</b>	<b>v</b>	<b>jużbuckie</b>	<b>a</b>	<b>jużbustwo</b>	<b>n</b>	
	bunrowne	a	bunrostwo	n	bunric	v	
	<b>fumlystwo</b>	<b>n</b>	<b>fumlic</b>	<b>v</b>	<b>fumlyte</b>	<b>a</b>	
		<b>List 1</b>	<b>GC</b>	<b>List 2</b>	<b>GC</b>	<b>List 3</b>	<b>GC</b>
	Stimuli lists for Study 4	nefkiczyc	v	nefkidlo	n (neut)	nefkickie	a (neut)
tyzja		n (fem)	tyzjawskie	a (neut)	tyzjowac	v	
dyzmuwskie		a (neut)	dyzmuwac	v	dyz mudlo	n (neut)	
fumzic		v	fumzyt	n (masc)	fumzięty	a (masc)	
szopfudlo		n (neut)	szopfuty	a (masc)	szopfic	v	
fumlycki		a (masc)	fumlic	v	fumlyt	n (masc)	
jużbować		v	jużba	n (fem)	jużbocka	a (fem)	
chynfyt		n (masc)	chynfowska	a (fem)	chynfowac	v	
nytczacka		a (fem)	nytczowac	v	nytcza	n (fem)	

Table 4

*Means and Standard Deviations for the Dependent Variables in Studies 2 to 4 by Grammatical Category Condition*

		Verbs		Adjectives		Nouns	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Study 2	Agency/communion	0.61	0.22	0.48	0.23	0.50	0.24
Study 3	Agency	1.44	1.84	0.21	1.62	0.18	1.76
	Communion	0.13	1.50	-0.10	1.55	-0.57	1.72
	Abstractness	0.45	2.22	0.60	2.15	0.44	2.06
	Valence	0.09	1.57	0.05	1.62	-1.14	1.85
Study 4	Agency	0.24	2.07	0.10	1.57	-0.17	1.56
	Communion	-0.37	1.88	0.14	1.60	-0.37	1.52
	Abstractness	0.26	2.10	0.34	2.10	-0.16	2.32
	Valence	-0.82	1.94	0.08	1.65	-0.50	1.79

*Note.* In Study 2, Agency-Communion was assessed with a forced choice item with communion coded as 0 and agency coded as 1. Higher values indicate a stronger tendency toward agency choices.

Table 5

*Summary of Two-Level Logistic Regression Analysis Predicting Forced Choice Outcomes in Study 2.*

Predictor	<i>B</i>	<i>SE</i>	Odds Ratio
<i>Within level</i>			
Contrast 1	0.16**	0.06	1.17
Contrast 2	-0.05	0.09	0.95
<i>Between level</i>			
Threshold	-0.11*	0.05	
Residual variance	0.00	0.00	

*Note.* Contrast 1 contrasts verbs (coded as 2) with adjectives and nouns (both coded as -1). Contrast 2 contrasts adjectives (1) with nouns (-1). The forced choice dependent variable was coded with communion = 0 and agency = 1.  
 \*\*\*  $p < .001$ ; \*\*  $p < .01$ ; \*  $p < .05$ .

Table 6  
*Estimates and Fit Indices for Saturated and Constrained Model in Studies 3 and 4*

	Study 3 - saturated		Study 3 - constrained		Study 4 - saturated		Study 4 - constrained	
	<i>Estimate</i>	<i>SE</i>	<i>Estimate</i>	<i>SE</i>	<i>Estimate</i>	<i>SE</i>	<i>Estimate</i>	<i>SE</i>
<i>Within level - Agency</i>								
Contrast 1	0.37***	0.07	0.37***	0.07	0.15*	0.06	0.16**	0.06
Contrast 2	-0.07	0.11	0.00	0.00	0.06	0.08	0.00	0.00
Valence	0.17**	0.05	0.16**	0.05	0.26***	0.04	0.27***	0.04
Abstractness	-0.13***	0.03	-0.13***	0.03	0.00	0.03	0.003	0.03
<i>Within level - Communion</i>								
Contrast 1	0.07	0.06	0.00	0.00	-0.02	0.53	0.00	0.00
Contrast 2	0.02	0.08	0.00	0.00	0.13	0.07	0.00	0.00
Valence	0.36***	0.04	0.36***	0.04	0.40***	0.03	0.41***	0.03
Abstractness	0.03	0.03	0.02	0.03	0.05*	0.02	0.05*	0.02
Agency with Communion	0.57*	0.25	0.57*	0.25	0.72**	0.22	0.73**	0.22
Residual Variances								
Agency	4.97***	0.44	4.97***	0.44	5.90***	0.42	5.91***	0.42
Communion	4.37***	0.36	4.39***	0.36	4.64***	0.35	4.66	0.36
<i>Between level</i>								
Agency	0.60***	0.12	0.60***	0.12	0.06	0.10	0.06	0.10
Communion	-0.19*	0.10	-0.19*	0.10	-0.22*	0.09	-0.22*	0.09
Agency with Communion	0.42*	0.19	0.42*	0.19	0.23	0.12	0.22	0.12
Residual Variance								
Agency	0.89**	0.30	0.89**	0.30	0.49*	0.20	0.49*	0.20
Communion	0.49**	0.16	0.49**	0.16	0.39**	0.13	0.38**	0.13
<i>Model Fit</i>								
$\chi^2$ (df)			2.16 (3)				3.06 (3)	
$\chi^2$ p-value			0.54				0.38	
RMSEA			0.0				0.0	
CFI			1.0				1.0	
TLI			1.0				1.0	
SRMR <sub>w</sub>			0.01				0.01	
SRMR <sub>B</sub>			0.002				0.002	

Table 7

*Frequency Summary of Selected Agent Nouns and Infinitives in Three English Corpora*

Word	BYU-BNC	COCA	GLOWBE
eater / to eat	109 / 2762	714 / 15987	2953 / 70790
smoker / to smoke	184 / 265	1292 / 1535	4804 / 4924
runner / to run	666 / 4533	3563 / 23933	15699 / 94914
voter / to vote	279 / 1105	5059 / 9476	29599 / 57190
cheater / to cheat	7 / 93	306 / 752	1567 / 4370
a program / to program	354 / 56	8127 / 597	17950 / 2373
a trace / to trace	213 / 513	1453 / 1268	2435 / 4651
a rush / to rush	337 / 303	1907 / 1451	4729 / 5590
a taste / to taste	431 / 285	2493 / 5884	9321 / 6707
a whip / to whip	83 / 63	334 / 484	918 / 1961

*Note.* BYU-BNC = British National Corpus. COCA = Corpus of Contemporary American English. GLOWBE = Corpus of Web-Based Global English

<sup>1</sup> In a more refined version of the LCM (e.g., Wigboldus & Douglas, 2007; Semin & Fiedler, 1991) another category is mentioned, namely state action verbs (SAV). This is an ambiguous category in the LCM framework. For instance, in the Linguistic Category Model coding manual (Coenen, Hedeboew, & Semin, 2006 – page 7) it is written, that “Because SAVs are very similar to IAVs they are often treated as IAVs. Moreover, these types of verbs don’t differ significantly in abstraction level (Semin & Fiedler, 1991).” With the example “Person X thinks about this topic” it is evident, that also state action verbs convey a sense of agency and dynamism (a specific topic for a temporary time). This distinction highlights that action verbs dominate the grammatical category of verbs and substantiate our claim that a prototypical verb refers to an action. We will return to a discussion of state verbs, the smallest and arguably atypical verb category, in the general discussion.

<sup>2</sup> The results remain robust, however, when including these auxiliary words in the analyses (*Gender Polish*: Odds Ratio = 1.34, 95%CI = [1.30; 1.37], *Gender German*: Odds Ratio = 1.34, 95%CI = [1.32; 1.35], *Age Polish*: Odds Ratio = 2.24, 95%CI = [1.97; 2.56], *Age German*: Odds Ratio = 1.25, 95%CI = [1.22; 1.28]).

<sup>3</sup> For German, we ran a supplemental analysis with a smaller archive (Tagged-M), which allowed for more detailed search criteria to maximize the likelihood that the verb referred to the intended target words. The verb characteristics were specified as follows: active voice, 3<sup>rd</sup> or 1<sup>st</sup> person singular or plural (matching the target). Even with these restricted criteria, the targets characterized by high agency were more frequently followed by verbs than the targets characterized by low agency (Gender: Odds Ratio = 1.21, 95%CI = [1.12; 1.31], Age: Odds Ratio 1.41, 95%CI = [1.03; 1.92]).

<sup>4</sup> The experiments adhere to the APA ethical guidelines and were approved by an institutional ethics board at the University of Humanities and Social Sciences (number of the approval 24/IV/11-12).

<sup>5</sup> Note that in Polish, words unequivocally are categorized to grammatical categories (e.g., the help and to help would be different words *pomoc* and *pomagać* in Polish).

<sup>6</sup> An alternative analysis was run in which verbs were contrasted separately against adjectives and nouns (with two dummy variables coding verbs as the reference category). The results were in accord with the hypothesis. Both adjectives ( $B = -0.53$ ;  $SE = 0.20$ ;  $p = .007$ ) and nouns ( $B = -0.43$ ;  $SE = 0.19$ ;  $p = .03$ ) were seen as less agentic than verbs.

<sup>7</sup> When the judgments of the extent to which artificial words reminded participants of the real grammatical categories were included in the main analysis, the overall pattern of results was preserved and the role of similarity to real grammatical categories on the judgments of agency and communion was negligible.

<sup>8</sup> An alternative analysis was run with two dummy codes using verbs as the reference category. The first dummy variable compared adjectives, the second variable compared nouns to the verb category. The results were in accord with the hypothesis. Both adjectives ( $B = -1.19$ ;  $SE = 0.21$ ;  $p < .001$ ) and nouns ( $B = -1.05$ ;  $SE = 0.24$ ;  $p < .001$ ) were seen as less agentic than verbs. Compatible with the main analysis, neither adjectives nor nouns differed from verbs in terms of communion (both  $ps > .25$ ). When non-significant paths were set to 0 and an equality constrain was placed on the paths leading from the dummy variables to agency, the model had a very good fit  $\chi^2(4) = 2.70$ ;  $p = .61$ ; RMSEA = .00; CFI = 1. The results corroborate the hypothesized basic model and indicate that the verb-agency link holds equally for comparisons with adjectives and nouns.

<sup>9</sup> An alternative analysis was run in which two dummy codes were created. The first dummy category compared adjectives, the second category compared nouns to the verb category. The results were in accord with the hypothesis. Both adjectives ( $B = -0.40$ ;  $SE = 0.20$ ;  $p = .04$ ) and nouns ( $B = -0.52$ ;  $SE = 0.20$ ;  $p = .008$ ) were seen as less agentic than verbs. Compatibly with the main analysis, neither adjectives nor nouns differed from verbs in terms of communion (both  $ps > .32$ ). When non-significant paths were set to 0 and an equality constrain was placed on the paths leading from the dummy variables to agency, the model had a very good fit  $\chi^2(4) = 2.41$ ;  $p = 0.66$ ; RMSEA = .00; CFI = 1. The results corroborate the hypothesized basic model and indicate that the verb-agency link holds equally for comparisons with adjectives and nouns.



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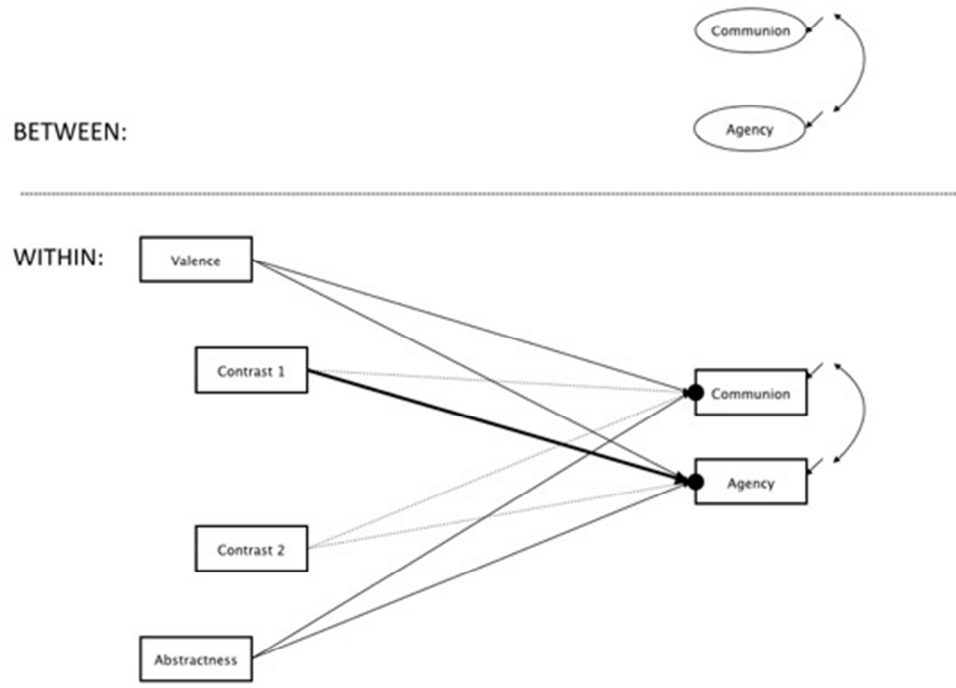


Figure 1. Conceptual model tested in Study 3 and 4. Contrast 1 contrasts verbs (coded as 2) with adjectives and nouns (both coded as -1). Contrast 2 contrasts adjectives (1) with nouns (-1).