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ARTICLE

Breaking the ice in a conversation: abstract words prompt dialogs more easily than concrete ones

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Abstract

Abstract domains of knowledge may have social origins. However, whether abstract concepts (ACs) may also differentially affect communicative interaction and conversation has not been explored. Here, we studied ACs' communicative functions by collecting in an Italian and an English sample, ratings for concrete concept (CC) and ACs related to three main dimensions: communicative/pragmatic [i.e., Openness to Negotiation (ON), Easiness to Start a Conversation (ESC)], semantic/metacognitive [i.e., Social Metacognition (SM) – perceived need of others, Word Confidence (WC), Contextual Availability (CA)], and emotional–experiential (i.e., Pleasantness, Valence, Familiarity). Overall, Italian participants judged it was easier to start a conversation, the more pleasant, familiar, and positively valenced were rated the concepts. Crucially, at lower values of the emotional–experiential component (i.e., Familiarity in the Italian sample, also Pleasantness and Valence in an English sample), there was an advantage of ACs over CCs in the ESC. Moreover, in the Italian sample, participants rated ACs higher on SM, ON, and lower on WC and CA. Notably, in both the Italian and English sample, ACs with higher ratings on the ESC dimension belonged to the Self-Sociality subcluster. The results offer new insights into the pragmatic aspects linked to ACs' use.

Keywords: sociality; language; abstract concepts; conversation; ratings

1. Introduction

Abstract concepts (ACs) (i.e., "democracy," "justice," "peace") are thought to be mainly acquired through linguistic interactions (Wauters et al., 2003) because they

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rely less on experiences made through the five senses than concrete concepts (CCs). Their meanings are grounded in social interactions, which represent the essential scaffolding allowing the emergence of "shared-cultural labels" conveying complex knowledge (Borghi, 2022; Fini et al., 2021, 2023; Fini & Borghi, 2019). Evidence suggesting the involvement of mouth motor areas during the processing of ACs supports this view (Borghi et al., 2011; Borghi & Zarcone, 2016; Dreyer & Pulvermüller, 2018; Fini et al., 2022; Ghio et al., 2013; Granito et al., 2015; Mazzuca et al., 2018). According to the Words As social Tool (WAT) proposal (Borghi et al., 2017, 2018, 2019), mouth activation may be interpreted as: (i) preparing to complement our knowledge by asking reliable sources [Social Metacognition (SM), Borghi, 2022; Borghi et al., 2017, 2018, 2019; Shea, 2018); (ii) re-explaining to ourselves the meaning associated with the concept and (iii) simulating the linguistic experience through which we have learned ACs in the first place. The specific mechanisms – not mutually exclusive – that might activate mouth motor areas share a common ground: ACs evoke linguistic experiences.

Linguistic experiences represent the modality through which humans can efficiently communicate and create a space of intersubjective knowledge. Abstract knowledge emerged, indeed, as the result of intellectual agreements on shared meanings attributed to experiences and validated by communities (see Gilead et al., 2020). Although the process of conflating different experiences in a single symbol characterizes all concepts and words (e.g., Deacon, 1998; Dunbar, 1998), the heterogeneity of experiences that ACs evoke makes people more uncertain of their meaning and renders the input and interaction with others particularly crucial. During their use, we might need to rely on other people to understand the meaning of words on which we are uncertain or to negotiate their meaning (Borghi, 2022; Mazzuca & Santarelli, 2022). Consequently, the full development of abstract representations might rely upon successful linguistic exchanges among conspecifics (see Dunbar, 1998). ACs would not only be the "glue" holding together scattered and heterogeneous information (see the notion of situational systematicity in Davis et al., 2020), but they would also represent the "social glue" providing a common reference of knowledge within societies (Borghi, 2022; Borghi & Tummolini, 2020; Mazzuca et al., 2021; Mazzuca & Santarelli, 2022). For example, values, cultural notions, scientific knowledge, and socio-political definitions are the result of a *diachronic linguistic exchange* which contributes to creating a connection among individuals. Along these lines, dialogical exchanges might be a source allowing us to detect the social nature of ACs. Because of the relevance of social interactions for ACs definition, recently authors have underlined the necessity to investigate ACs' use, for example, during conversations (Banks et al., 2022; Borghi, 2022), since they represent the spontaneous human practices of being in relation. Social interactions, thus, appear to be one of ACs' learning environment, and the question arises as to how spontaneous conversations use ACs (Borghi & Binkofski, 2014; Dove, 2009, 2011, 2014; Prinz, 2012). While many studies focused on semantic, emotional, social (Della Rosa et al., 2010; Diveica et al., 2022; Villani et al., 2019), and interoceptive conceptual dimensions (Connell & Lynott, 2012; Villani et al., 2021), more pragmatic dimensions of ACs still need to be explored (for an exception, see Villani et al., 2022). Pragmatic dimensions might offer important insights for accurately selecting stimuli materials in new interactive ecological paradigms. A promising research avenue, indeed, consists in studying ACs in natural environments where they are acquired and used for communication. The adoption of more ecological experimental settings

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in which dialogs spontaneously evolve might help to better understand i) the use of concepts in daily life and ii) the psychological and bodily synergies which are both causes and effects of linguistic exchanges. However, if, on the one hand, interactive paradigms represent a valuable and ecological experimental approach, on the other hand, they also require an additional effort to better control for unexplored variables which might intervene during linguistic exchanges. In this regard, here we explore a specific pragmatic dimension that we called "Easiness to Start a Conversation" (ESC), which touches upon aspects related to the capability of a concept to trigger a conversational exchange. Given their intrinsic social and dialogical nature, we expect that compared to CCs, ACs might more easily "afford" conversations.

In the current study, we operationalized this conjecture by investigating the perceived facility to start a conversation on concepts of different abstractness levels. To this aim, we asked participants to rate abstract and concrete words along different dimensions, spanning from more traditional to less explored ones. These are labeled here as semantic/metacognitive [i.e., SM – perceived need of others, Word Confidence (WC), Contextual Availability (CA)], communicative/pragmatic [i.e., Openness to Negotiation (ON), ESC), and emotional–experiential (i.e., Pleasantness, Valence, Familiarity). Specifically, ESC concerns the estimation of how easy it is to start a conversation with a specific concept. SM (Villani et al., 2019) refers to the degree to which the participant feels the need to rely on others to understand the concept's meaning. WC (Mazzuca et al., 2022) relates to the extent to which participants feel confident in their understanding of a concept's meaning. ON refers to the degree to which participants feel prone to negotiate with others the concepts' meaning (see Mazzuca & Santarelli, 2022). CA (Schwanenflugel et al., 1988) refers to the ease with which the participant can think of a context or a circumstance associated with the word or in which the word may appear. Familiarity (FAM, Barca et al., 2002) measures how much participants think they know the word. Finally, Valence (Bradley & Lang, 1999; Mohammad, 2018) refers to the degree of positiveness/negativeness of a word, while Pleasantness relates to how much a concept is judged to be pleasant or unpleasant. In particular, we decided to focus here just on the ESC dimension because it represents a valuable aspect for studying the relationship between lexicon and social interaction. Gathering knowledge of the kinds of words considered more suitable to start a dialog is the very first step to approaching conversational dynamics. The other new pragmatic dimension ON, equally worth to be explored, will be investigated in more detail, in separate studies. Because the meaning of ACs finds its natural source in socio-linguistic exchanges, we predict that ACs will be rated higher on ESC than CCs, regardless of their scores on Pleasantness, Valence, and Familiarity. In line with previous evidence, here we also predict that ACs will be rated higher than CCs on ON because of the indeterminacy of their meaning (see Mazzuca & Santarelli, 2022). They should also score higher on SM because others are needed to understand or negotiate their meaning, and lower on WC. In line with the literature, ACs should also score lower in CA than CCs. In addition, we expect that higher ratings on ESC for ACs will be partially explained by higher ratings on SM, ON, WC, and CA.

Moreover, we explored whether different subclusters of abstract (Villani et al., 2019) and CCs differ in their rating scores for ESC and whether higher ratings on SM, ON, WC, and CA would partially explain these results. The philosophical–spiritual concepts (PS) (i.e., "prestige," "paradise," "infinity") refer to religious words, principles, concepts linked to argumentation, reasoning, decision-making, and negatively

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connoted words, related to characteristics of the self. The emotional concepts (EM) (i.e., "pride," "irony," "patience") refer to emotions, mental states, emotionally connoted social situations, and characteristics of the self with respect to others. Then, self-sociality concepts (SS) (i.e., "politeness," "attention," "merit") indicate the interpersonal mental states and finally, the physical spatio-temporal and quantitative concepts (PSTQ) (i.e., "sum," "number," "subtraction") refer to interactions with external objects/entities (Villani et al., 2019). We were interested in understanding whether these subclusters of concepts might be differently categorized as a function of the examined dimensions, in particular of the new communicative/pragmatic dimensions. Finally, we performed an exploratory study involving an English native sample to gather knowledge about the cross-cultural evaluation of the same dimensions in AC and CC.

1.1. Study 1

Study 1 hypotheses, methods, and analyses were formally pre-registered (https://osf.io/sym9p). As declared in the preregistration, we performed a rating study with an Italian sample of participants to investigate the dimension of ESC along with the dimensions of Pleasantness, Valence, Familiarity, SM, ON, WC, and CA. Stimuli were both AC and CC.

2. Method

2.1. Participants

A total of 48 Italian participants took part in the study in a window between January 31 and April 8 2022. Participants were recruited via anonymous links either by posting the surveys on social networks (Facebook, Twitter) or spreading the questionnaires through the research team's extended network of acquaintances. Italian was the native language of all the participants, who were naïve about the purpose of the experiment. Their participation was voluntary and not reimbursed.

The required sample size was previously estimated through a statistical power analysis (Cohen, 2013), performed with the software More Power 6.0.4 (Campbell & Thompson, 2012) based on the effect size obtained in a preliminary pilot study, as described in the preregistration (https://osf.io/sym9p). More specifically, in the pilot study, we asked 115 participants in 4 different surveys to rate 108 words (68 abstract, 60 concrete) on Pleasantness, Valence, and ESC. It emerged that ACs were rated significantly higher ($M = 4.06$; SE = 0.12, $\eta p2 = 0.38$) on ESC dimension, as compared to CCs ($M = 3.11$; SE = 0.13). Thus, in Study 1 we used the partial eta squared value (0.38), that is, the effect size of the main effect of Category of Concepts (abstract, concrete) on the dependent variable ESC in the pilot study as the expected effect size for the power analysis. The output indicated that for a two within-factors design (Category, abstract vs. concrete), 24 participants rating each dimension were sufficient to reach a power of 0.95 and an eta squared of 0.38.

3. Materials and procedure

To prevent participants from fatiguing effects, we split the sample of words into two different surveys. The first survey was composed of two randomly presented blocks

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where 108 words were rated on Valence, ESC, Pleasantness, and Familiarity (Block 1), and CA, SM, WC, and ON (Block 2). The second survey was structured as the first survey, but it featured an additional sample of 108 words.

Since the surveys to be compiled were two, by taking into account the indication gathered from the power analysis, a sample of 48 participants was needed.

A total of 144 participants were originally contacted. We excluded 96 participants, mostly because they did not complete the surveys, likely due to the surveys length ($N = 92$, 64.33% of the original sample), and a few because they provided random responses and faster than 10 minutes ($N = 4$, 0.02% of the sample). This resulted in a final sample of 48 participants, among which 24 participants (17 females and 7 males; *M* age = 24.88 years, $SD = 3.05$) rated the first subset of 108 words and the remaining 24 participants (17 females and 7 males; *mean M* age = 26.58 years, $SD = 9.05$) rated the second subset of 108 different words. Ethics permission was granted by the Ethics Committee of the Psychology Department at Sapienza University of Rome (Prot. n. 0001040–16/11/2020). Participants were informed of the general purpose of the study. Each survey provided informed consent. The study was implemented in Psytoolkit (Stoet, 2010, 2017), a free-to-use toolkit for experiments and survey design.

The stimuli were 108 abstract and 108 concrete words. The number of items was defined on the basis of the analyses conducted on a preliminary data collection described in the preregistered report (https://osf.io/sym9p). We doubled the number of items of the preliminary data collection in order to increase analysis reliability. ACs selected from Villani et al.'s (2019) database were counterbalanced for the four subclusters identified in Villani et al.'s (2019) and randomly assigned to one of the two surveys. Accordingly, we selected 27 physical, spatio-temporal, and quantitative concepts, for example, "scheme"; 27 philosophical and spiritual concepts, for example, "judgment"; 27 concepts related to the self and social concepts, for example, "politeness"; and 27 emotional and inner state concepts, for example, "happiness." CCs were selected from Montefinese et al. (2014) database and sampled to include the types of CCs more frequently identified in the literature (see Rumiati & Foroni, 2016; Villani et al., 2021; Warrington & Shallice, 1984). Specifically, we selected 36 food concepts, 36 animal concepts, and 36 artifacts. Participants were asked to rate each concept on eight dimensions, that is, Valence, Pleasantness, ESC, SM, WC, Context Availability, Familiarity, and ON through a Likert scale ranging from 0: "completely negative" to 7: "completely positive." We asked participants to evaluate some Valence of each word, the SM dimension, that is, the need to rely on other to better understand a concept; the Familiarity of each word; the WC, that is the degree to which we think to know the meaning of a word and, and the CA, that is, the degree to which we perceive easy to think about a context for each word. Moreover, we included three new dimensions: the ON dimension, referring to how much we feel open to negotiating the meaning of words; the Pleasantness of a word; and finally, the ESC, which it is the specific object of investigation in the current study. ESC refers to how much we consider easy to use a word to start a dialog (for further information about the scales, see Supplementary Materials).

Once participants agreed to take part in the study, they were presented with the rating task and asked to evaluate target words on the eight dimensions using the Likert scales scale. Before rating the concepts, participants were asked to report their age in numbers and their gender. They gave their responses into separate boxes for each target word presented per dimension. All data, scripts, and analyses are available at https://osf.io/tq3nb. Each participant was randomly assigned to compile one of the

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two surveys, hence rating a single subset of 108 words on all the dimensions across two blocks. The order of blocks and dimensions was randomized across participants, and items were randomly presented within each block.

4. Data analysis

Data pre-processing and data analysis were performed with R (R-Core Team, 2019) and RStudio (version 4.2.0). Statistical significance of fixed effects for mixed models was determined through type III ANOVA test from "afex" package (Singmann et al., 2015), and *p*-values were calculated with Satterthwaite's approximation. Post hoc comparisons were performed with the "emmeans" package (Lenth et al., 2019) using Tukey's correction for multiple comparisons. Principal component analysis (PCA) was carried out with "tidymodels" (Kuhn & Wickham, 2018) and hierarchical cluster analysis with "FactoMineR" (Lê et al., 2008).

5. Results

5.1. ACs are rated higher on ESC compared to CCs

In order to assess whether ACs would be rated higher on ESC compared to CCs regardless of their scores on Pleasantness (ACs $M = 3.7889$, $SD = 1.9778$; CCs $M = 3.7527$, $SD = 1.7609$), Valence (ACs $M = 4.0945$, $SD = 2.1590$; CCs $M = 4.0308$, $SD = 1.9073$), and Familiarity (ACs $M = 5.3912$, $SD = 1.8188$; CCs $M = 5.6878$, $SD = 1.7315$), we used linear mixed-effects models (Bates et al., 2014). In the first model ($R2C = 0.31$), we entered ESC scores as dependent variable and Category of Concepts (abstract vs. concrete) as a fixed effect. We included participants and words as random intercepts. The model showed a main effect of Category of Concepts, $F(1,214) = 14.65$, $p = 0.0001$, with higher means in the Abstract compared to the CCs condition (ACs $M = 3.65$, $SE = 0.191$; CCs $M = 3.27$, $SE = 0.191$).

Our second aim was to investigate whether this effect was modulated by Pleasantness, Valence, and Familiarity (i.e., the emotional–experiential dimension). To this end, we fitted additional models, which we describe below. To avoid multicollinearity, we computed Pearson correlations among these variables, which showed that Valence and Pleasantness were highly correlated, $R = 0.66$, $p < 0.0001$. Familiarity was correlated with Valence, $R = 0.42$, $p < 0.03$, but not with Pleasantness, $R = 0.24$, $p = 0.26$. Based on these results, we fitted two different models, both modeling ESC scores as a function of Category of Concepts (abstract vs. concrete) and including participants and items as random intercepts but varying for the chosen continuous predictors. Specifically, the first model (M1) included Familiarity and Pleasantness as continuous predictors, while the second model (M2) included Valence as a continuous predictor.

5.2. M1

The model with Pleasantness and Familiarity as continuous predictors ($R2C = 0.32$) yielded a significant main effect of Category of Concepts, $F(1,210.1) = 26.972$, $p < 0.0001$, Familiarity, $F(1,5124.1) = 128.851$, $p < 0.0001$, and Pleasantness, $F(1,4365.6) = 169.137$, $p < 0.0001$. The higher the ratings of Pleasantness, the higher

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the ratings of ESC (see Supplementary Figure S1). The main effects of Category of Concepts and Familiarity were better explained by a significant two-way interaction of Familiarity × Category of Concepts, $F(1,5119.7) = 25.696$, $p < 0.0001$. Simple slope analysis revealed that the slopes of AC (*LCI* 0.0794 – *UCI* 0.158) and CC (*LCI* 0.2086 – *UCI* 0.293) were significantly different from zero as a function of the factor Familiarity. The pairwise difference between the simple slopes of AC and CC as a function of Familiarity was significant, *estimate* = −0.132, *SE* = 0.026, $t(5121) = -5.068$, $p < 0.0001$, showing that more familiar concepts are also the ones with which it is easier to get a conversation started. It is worth noting that this also mediated the advantage of ACs over CCs previously discussed (see Supplementary Figure S3). More specifically, the lower the Familiarity, the higher the difference between ACs and CCs.

5.3. M2

The model with Valence as a continuous predictor ($R^2C = 0.31$) yielded a main effect of Category of Concepts, $F(1,213.4) = 15.5628$, $p < 0.0001$, and Valence, $F(1,3760.6) = 133.9786$, while the two-way interaction of Category of Concepts × Valence was not significant $F(1, 4160.4) = 0.2745$, $p = 0.60$. More valenced concepts are also those with which it is easier to start a conversation (see Supplementary Figure S2).

In conclusion, from the analysis emerged that ACs are rated higher on ESC compared to CCs (Fig. 1). Moreover, at the increase of concepts' Familiarity, the ACs advantage over CCs on ESC disappears. Finally, regardless of conceptual category (abstract/concrete), the more pleasant and positive valenced concepts are evaluated, the higher their ESC score.

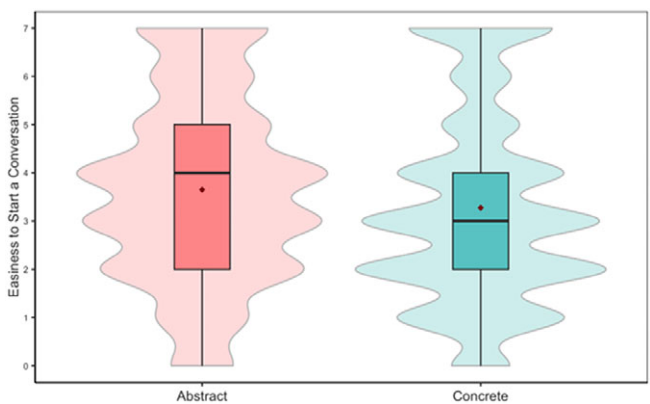

Fig. 1. Abstract concepts (ACs) are rated significantly higher than concrete concepts (CCs) in the Easiness to Start a Conversation (ESC). Horizontal lines in the boxes indicate the median, upper and lower borders indicate first and third quartiles, red rhombus represents the average of observations, and "whiskers" extend to the farthest points that are not outliers.

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5.4. ACs are rated higher on SM, ON, and lower on WC and CA compared to CCs

In keeping with our first prediction, we explored whether AC and CC differed in their ratings on SM, ON, WC, and CA using four linear mixed-effects models. Each of the models included Category of Concepts (abstract vs. concrete) as fixed factor, participants and items as random intercepts, and varied for the dependent variable used.

The model with SM as dependent variable ($R2C = 0.42$) showed a main effect of Category of Concepts $F(1,214) = 555.94$, $p < 0.0001$ (ACs $M = 1.855$, $SE = 0.176$; CCs $M = 0.504$, $SE = 0.176$), with higher means in ACs compared to CCs condition, see Fig. 2A.

The model with ON as dependent variable ($R2C = 0.52$) showed a main effect of Category of Concepts $F(1,214) = 852.25$, $p < 0.0001$ (ACs $M = 3.21$, $SE = 0.142$; CCs $M = 0.626$, $SE = 0.142$), with higher means in ACs compared to CCs condition, see Fig. 2B.

The model with WC as dependent variable ($R2C = 0.34$) showed a main effect of Category of Concepts $F(1,214) = 271.72$, $p < 0.0001$ (ACs $M = 5.57$, $SE = 0.151$; CCs $M = 6.45$, $SE = 0.151$), with lower means in ACs compared to CCs condition, see Fig. 2C.

The model with CA as dependent variable ($R2C = 0.49$) showed a main effect of Category of Concepts $F(1,214) = 784.43$, $p < 0.0001$ (ACs $M = 3.27$, $SE = 0.171$; CCs $M = 5.89$, $SE = 0.171$), with lower means in ACs compared to CCs condition, see Fig. 2D.

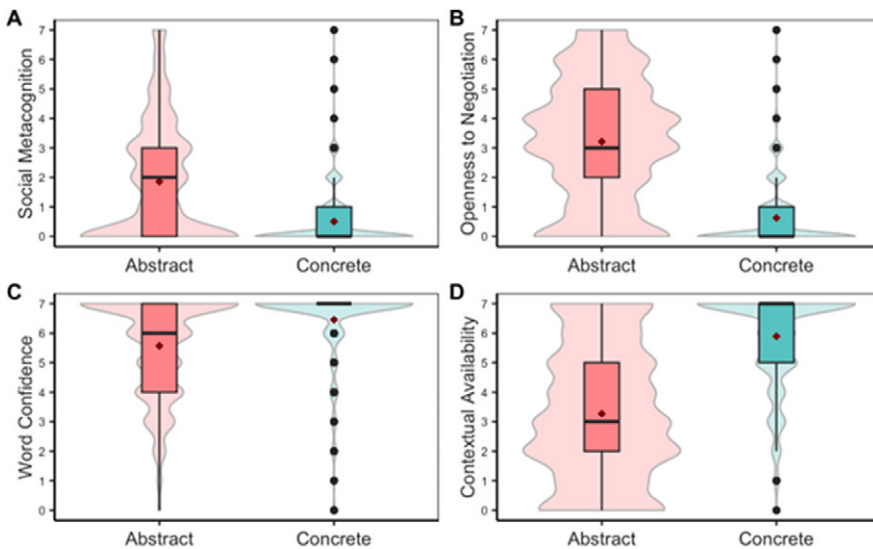

Fig. 2. The plots show abstract concepts (ACs) and concrete concepts (CCs) scores on Social Metacognition (SM), Openness to Negotiation (ON), Word Confidence (WC), and Contextual Availability (CA). Horizontal lines in the boxes indicate the median, upper and lower borders indicate first and third quartiles, red rhombus represents the average of observations, and "whiskers" extend to the farthest points that are not outliers. Panel (A). ACs ($M = 1.855$, $SE = 0.176$) are rated higher on SM than CCs ($M = 0.504$, $SE = 0.176$). Panel (B) ACs ($M = 3.21$, $SE = 0.142$) are rated higher on ON than CCs ($M = 0.626$, $SE = 0.142$). Panel (C) ACs ($M = 5.57$, $SE = 0.151$) are rated lower on WC than CCs ($M = 6.45$, $SE = 0.151$). Panel (D) ACs ($M = 3.27$, $SE = 0.171$) are rated lower on CA as compared to CCs ($M = 5.89$, $SE = 0.171$).

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In conclusion, results indicate that ACs are rated higher on SM, ON, and lower on WC and CA compared to CCs.

5.5. Metacognitive–semantic and emotional–experiential components explain most of words variance

Once we identified the dimensions that mostly explain ESC, we sought to explore how the words of our sample were distributed in the semantic space composed of our variables of interest as a function of ESC. So, we performed a PCA (Jollife, 2010) on the normalized rating dataset. PCA is a suitable method to extract a new set of features from an existing set of variables, explaining the variance in the dataset. Before applying PCA, all the variables (i.e., the average rating score per each dimension) were centered and standardized. We entered ESC as outcome variable and the other dimensions (SM, ON, WC, and CA) as numerical predictors. We focused on components that weigh more of |.3| (Mazzuca et al., 2022; Villani et al., 2019). The first two components extracted by the PCA explained together 83% of variance, with Component 1 explaining 52% of variance and Component 2 explaining the remaining 31%. The first component was mostly composed of semantic and experiential dimensions: SM, ON, WC, and CA. The second component was instead mostly characterized by emotional–experiential dimensions: Pleasantness, Valence, and Familiarity (see Table 1). The first component was characterized by the opposition between SM and ON, WC, CA, and Familiarity (Fig. 3). This suggests that the more we are confident about the meaning of the word (WC), the more we can retrieve contexts evoked by words (CA); the less we need others to master the meaning of the word (SM), and the less we are open to negotiating the word's meaning (ON). Crucially, AC and CC were sharply distinguished on the basis of the dimensions included in PC1, with ACs characterized by high scores on SM and ON and CCs characterized by high scores on WC and CA. The composition of the second component instead points to the fact that the more positively valenced, pleasant, and familiar the words are, the easier it is to start a conversation prompted by these words. In summary, through the (PCA) multivariate analysis, we identified two main components: a semantic–metacognitive one, composed of WC, SM, ON, and CA

Table 1. Contribution of each dimension on PC1 and PC2, and their positive and negative values

Dimensions	Values	Components
Familiarity	−0.28833	PC1
Pleasantness	−0.02321	PC1
Valence	−0.03107	PC1
Social metacognition	0.475916	PC1
Openness to negotiation	0.474826	PC1
Contextual availability	−0.47635	PC1
Word confidence	−0.48631	PC1
Familiarity	−0.37252	PC2
Pleasantness	−0.64173	PC2
Valence	−0.63348	PC2
Social metacognition	−0.11295	PC2
Openness to negotiation	−0.18734	PC2
Contextual availability	0.01059	PC2
Word confidence	−0.11086	PC2

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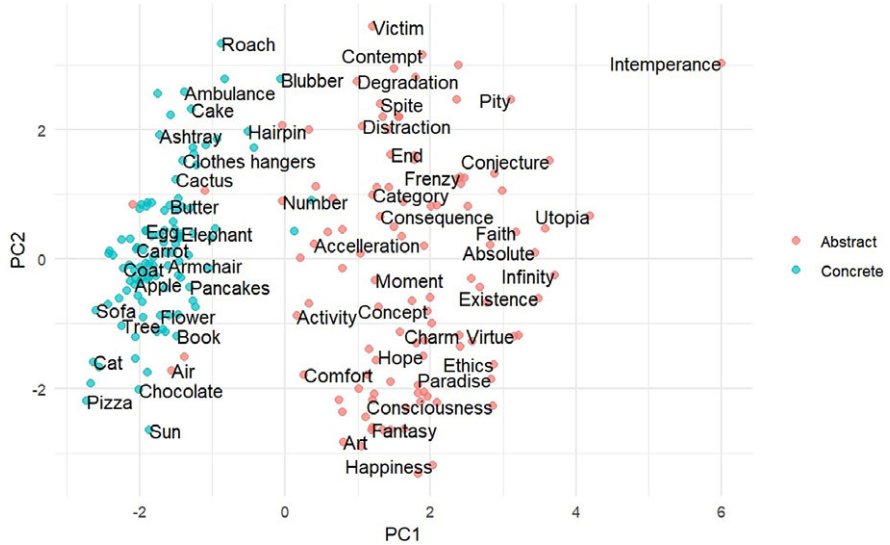

Fig. 3. Although abstractness~concreteness was not considered as a dimension in the PCA, looking at the plot, we notice that abstract and concrete words are quite sharply distinguished on the basis of PC1. For instance, words like "knowledge," "ethic," and "virtue" are characterized by high scores on Social Metacognition and Openness to Negotiation, and low scores in Word Confidence and Contextual Availability, and words like "orange," "sofa," and "pencil" by the opposite pattern.

components and an emotional–experiential one composed of Pleasantness, Familiarity and Valence components. While the first one fully captures the abstract–concrete categorical distinction, the second one indicates that regardless of conceptual category, the concepts evaluated as more positive, pleasant, and familiar are also considered as being easier to start a conversation with.

5.6. The emotional–experiential component better predicts ESC as a function of abstractness

After investigating how words are distributed in the semantic space composed of our targeted dimensions, we sought to determine which components contributed more to predict ESC. So, we fitted a linear model with ESC ratings as dependent variable, and the outcome of the PCA for each component as predictor ($R2C = 0.31$). The results showed a main effect of the second (PC2: emotional–experiential) component $F(1,213) = 93.78$, $p < 0.0001$. This shows that overall, emotional and experiential variables taken together predict ESC. Specifically, the more words were perceived as pleasant, positive, and familiar, the easier it is to start a conversation with them.

Given our hypotheses, we were also interested in assessing whether there is a difference between AC and CC. So, we fitted a linear mixed model with ESC as dependent variable, Category of Concepts (abstract vs. concrete) as categorical predictor, the components as continuous predictors, and random intercepts for words and participants. The model ($R2C = 0.30$) yielded a main effect of the Category of Concepts $F(1,215.1) = 5.41$, $p = 0.02$, and of the second (PC2: emotional–experiential) component $F(1,215.1) = 72.69$, $p < 0.0001$. These two main effects

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were better explained by the significant two-way Category of Concepts × PC2 (emotional–experiential component) interaction $F(1,215.1) = 8.60$, $p = 0.003$.

Simple slope analysis revealed that the slopes of AC (*LCI* 0.130 – *UCI* 0.258) and CC (*LCI* 0.275 – *UCI* 0.521) were significantly different from zero as a function of PC2. The pairwise difference between the simple slopes of AC and CC as a function of PC2 was significant (*estimate* = 0.204, $SE = 0.0703$, $t(220) = -2.899$, $p = 0.0041$), showing that the more concepts are familiar, positively valenced, and pleasant, the higher the ESC and the less is the difference between AC over CC. In conclusion, the results indicate that PC2 (emotional–experiential component) is stronger as compared with PC1 (semantic–metacognitive component) in predicting the ESC dimension.

6. Explorative analysis

6.1. Self-Sociality and emotional concepts are rated higher on ESC compared to both other sub-kinds of ACs, and sub-kinds of CCs

Recently, multiple representation theories have consolidated the idea that the abstract–concrete dichotomy does not suffice for the full identification of all the conceptual features. Many dimensions like interoception, emotions, language, and social interaction contribute to provide a more exhaustive conceptual clustering (see Banks et al., 2022). For this reason, we decided to explore whether specific ACs' semantic subclusters identified by Villani et al. (2019) differ on the ESC dimension.

To this end, we fitted a model (M1) with ESC as dependent variable, Subcluster of Concept as a fixed factor, and random intercepts for participants and words ($R2C = 0.31$).

6.2. M1

The model showed a main effect of Subcluster of Concept $F(6,209) = 10.366$, $p < 0.0001$. Tukey post hoc comparisons indicated that Emotional concepts ($M = 4.03$, $SE = 0.219$) were rated significantly higher on ESC compared to Food concepts ($M = 3.35$, $SE = 0.209$, $t(209) = 4.011$, $p < 0.0016$), Artifacts concepts ($M = 3.21$, $SE = 0.209$, $t(209) = -4.869$, $p < 0.0001$), Animals concepts ($M = 3.26$, $SE = 0.209$, $t(209) = -4.546$, $p = 0.0002$), Physical Space Time and Quantity concepts ($M = 3.28$, $SE = 0.219$, $t(209) = 4.135$, $p < 0.0001$), and Philosophical and Spiritual concepts ($M = 3.18$, $SE = 0.219$, $t(209) = 4.726$, $p < 0.0001$). Likewise, Self-Sociality ($M = 4.11$, $SE = 0.219$) concepts were rated significantly higher on ESC compared to all CCs, that is, Food concepts ($M = 3.35$, $SE = 0.209$, $t(209) = -4.496$, $p = 0.0002$), Artifacts concepts ($M = 3.21$, $SE = 0.209$, $t(209) = -5.354$, $p < 0.0001$), and Animals concepts ($M = 3.26$, $SE = 0.209$, $t(209) = -5.032$, $p < 0.0001$), and to the other abstract Physical Space Time and Quantity concepts ($M = 3.28$, $SE = 0.219$, $t(209) = 4.589$, $p < 0.0002$) and Philosophical and Spiritual concepts ($M = 3.18$, $SE = 0.219$, $t(209) = -5.180$, $p < 0.0001$). There was instead no difference on scores of ESC between Emotional and Self-Sociality concepts, $t(209) = -0.454$, $p = 0.999$ (see Fig. 4A). In summary, Emotional and Self-Sociality concepts scored significantly higher on ESC.

Since the pattern of results of previous analyses suggested that Familiarity and Pleasantness significantly modulated ESC with AC and CC, we aimed at assessing

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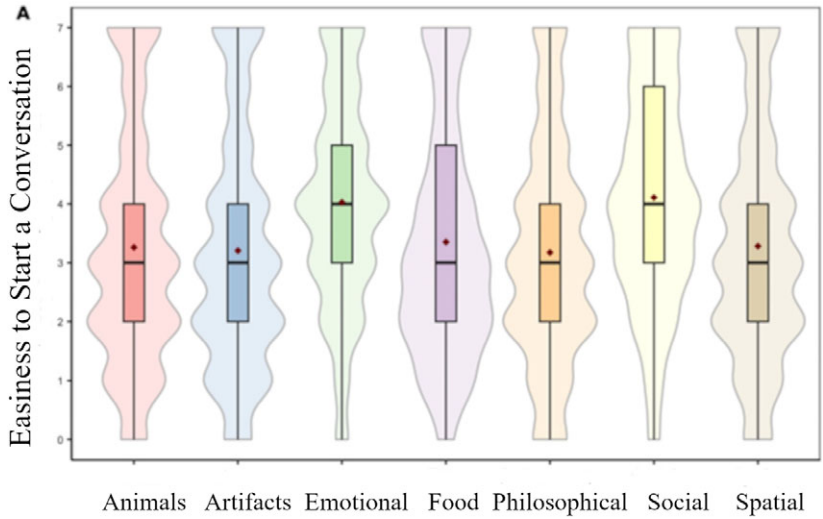

Fig. 4A. The plot shows the main effect of Subcluster of Concepts yielded by the model with Easiness to Start a Conversation (ESC) as dependent variable, Subcluster of Concepts as fixed factor, and participants and words as random intercepts, Emotional ($M = 4.03$, $SE = 0.219$) and Self-Sociality ($M = 4.11$, $SE = 0.219$) concepts scored significantly higher on ESC as compared to all the other Subclusters (Food: $M = 3.35$, $SE = 0.209$; Artifacts: $M = 3.21$, $SE = 0.209$; Animals: $M = 3.26$, SE = 0.209; Physical Space Time and Quantity: $M = 3.28$, $SE = 0.219$; Philosophical and Spiritual: $M = 3.18$, $SE = 0.219$).

whether this was the case also with more fine-grained conceptual categories. Specifically, we wanted to verify whether the advantage of Emotional and Self-Sociality concepts was due to higher scores in Familiarity and Pleasantness.

So, we performed a second model (M2) ($R2C = 0.33$) with ESC as dependent variable, the Subcluster of Concepts as a fixed factor, as continuous predictors Familiarity and Pleasantness, and as random intercepts participants and words.

6.3. M2

The model showed a main effect of Subcluster $F(6, 2479.9) = 8.6807$, $p < 0.0001$, of Familiarity $F(1,5090.6) = 111.7541$, $p < 0.0001$, and Pleasantness $F(1,4424.6) = 156.7418$, $p < 0.0001$.The main effects of Familiarity and Subcluster were better explained by the two-way interaction Familiarity × Subcluster $F(6, 5081.9) = 6.0737$, $p < 0.0001$. Simple slope analysis revealed that the slopes of all the subclusters were significantly different from zero as a function of Familiarity: Emotional (*LCI* 0.0866 – *UCI* 0.254), Artifacts (*LCI* 0.1560 – *UCI* 0.289), Animals (*LCI* 0.2278 – *UCI* 0.357), Food (*LCI* 0.1729 – *UCI* 0.310), Philosophical and Spiritual (*LCI* 0.0196 – *UCI* 0.146), Self-Sociality (*LCI* 0.053 – *UCI* 0.215), and Physical Space Time and Quantity concepts (*LCI* 0.0150 – *UCI* 0.154). The pairwise difference between the simple slopes of Animals Subcluster and Philosophical and Spiritual (estimate = 0.20960, $SE = 0.0444$, $t(5113) = 4.723$, $p < 0.0001$), Physical Space Time and Quantity (estimate = 0.20812, $SE = 0.0464$, $t(5104) = 4.486$, $p < 0.0002$), and Self-Sociality (estimate = 0.15823, $SE = 0.0507$, $t(5113) = 3.123$, $p = 0.0298$) Subclusters as a function of Familiarity was significant. The pairwise difference between the simple slopes of Artifacts Subcluster and Philosophical and

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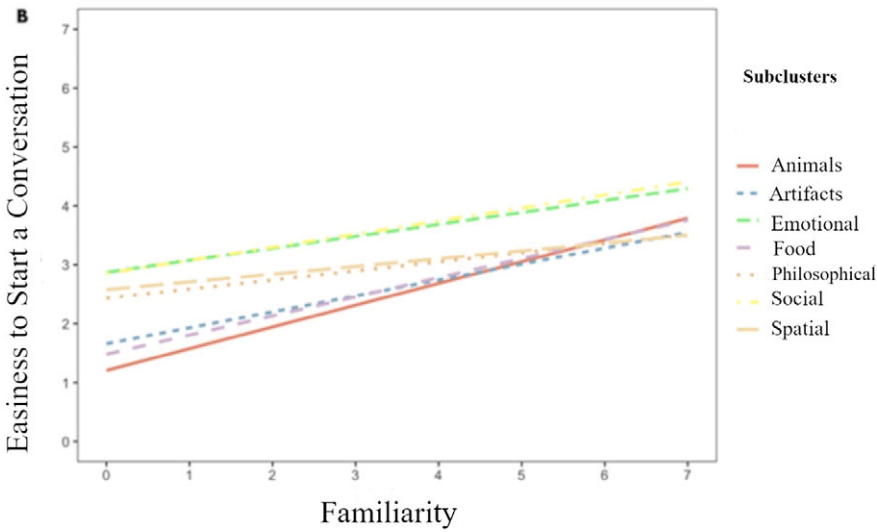

Fig. 4B. The plot shows the predicted values of the outcome variables. Shaded bands represent the confidence intervals (95%). The higher the participants' scores of Familiarity, the higher the Easiness to Start a Conversation scores.

Spiritual Subcluster was significant (estimate = 0.13944, $SE = 0.0451$, $t(5087) = 3.092$, $p = 0.0320$). The pairwise difference between the simple slopes of Food Subcluster and Philosophical and Spiritual (estimate = 0.15874, $SE = 0.0458$, $t(5078) = 3.469$, $p < 0.001$) and Physical Space Time and Quantity (estimate = 0.15726, $SE = 0.0477$, $t(5073) = 3.300$, $p = 0.0169$) Subclusters was significant. To summarize, the advantage of the Emotional and Self-Sociality concepts on ESC dimension was not explained by Familiarity. As shown in Fig. 4B, the advantage of Emotional and Self-Sociality Subclusters is present independently of the Familiarity dimension.

6.4. *Abstractness ~ concreteness fully captures the words' distribution as a function of new pragmatic-emotional dimensions*

Although many of the dimensions we targeted in our study are commonly employed in studies on conceptual representations, some of these dimensions, like ON, ESC, and Pleasantness, are new.

For this reason, we were interested in understanding whether our data would be grouped in new subclusters on the basis of the eight dimensions explored. So, we performed a hierarchical cluster analysis based on Euclidean distances between our variables. Silhouette's Index (Chouikhi et al., 2015) indicated two as the best number of clusters for our data (SI = 0.2). We identified relevant clusters based on their Euclidean distance on the dimensions of ratings, using Ward's clustering algorithm (see Harpaintner et al., 2018; Mazzuca et al., 2020 for similar methods), an agglomerative clustering algorithm that minimizes the total within clusters variance.

Cluster 1 included all concrete words but few abstract words, while Cluster 2 included all abstract words but few concrete words. Cluster 1 encompasses words with higher scores on Familiarity ($M1 = 5.69$, $M2 = 5.35$, $t(214) = 5.10$, $p < 0.0001$),

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CA ($M1 = 5.71$, $M2 = 4.59$, $t(214) = 23.21$, $p < 0.0001$), and WC ($M1 = 6.44$, $M2 = 6.01$, $t(214) = 19.74$, $p < 0.0001$) compared to words in Cluster 2. By contrast, words in Cluster 1 had lower scores on SM ($M1 = 0.59$, $M2 = 1.17$, $t(214) = -21.525$, $p < 0.0001$), ON ($M1 = 0.72$, $M2 = 1.90$, $t(214) = -33.58$, $p < 0.0001$) and ESC ($M1 = 3.25$, $M2 = 3.72$, $t(214) = -4.93$, $p < 0.0001$) compared to words in Cluster 2. The two clusters did not differ for Valence ($M1 = 4$, $M2 = 4.13$, $t(214) = -0.76$, $p = 0.45$) and Pleasantness ($M1 = 3.69$, $M2 = 3.85$, $t(214) = -1.14$, $p = 0.25$). In conclusion, ACs are polarized in a cluster with the following features: high SM, high ON, and high ESC, while CCs are polarized in a cluster with the following features: high WC, high CA, and high Familiarity.

7. Interim conclusions

In summary, the overall analysis showed that the more pleasant, familiar, and positively valenced were rated the concepts, and the easier to start a conversation with was evaluated. At lower values of the Familiarity dimension, ACs were rated as higher than CCs in the ESC dimension. Moreover, ACs were rated higher on SM, ON, and lower on WC and CA. From the PCA analysis, we extracted two dimensions: one emotional–experiential, one semantic–metacognitive. The first one is composed of Familiarity, Valence, and Pleasantness and stronger predicts the ESC dimension, the second one is composed of WC, CA, SM, ON, and markedly distinguishes AC and CC. The subclusters of ACs with the highest rating in the ESC dimension were the Self-Sociality and emotional subclusters; this result was not explained by the Familiarity dimension. Finally, on the basis of the explored dimensions (Pleasantness, Familiarity, Valence, SM, WC, CA, and ON), we identified through the hierarchical cluster analysis two clusters of concepts. One cluster corresponded to ACs with high SM, high ON, and high ESC, while the other cluster corresponding to CCs with high WC, high CA, and high Familiarity.

7.1. Study 2

Although not included in the preregistration, we performed an additional rating study on the ESC dimension, together with Pleasantness and Valence dimensions targeting an English native sample. Our aim was to verify whether the advantage of AC vs. CC on ESC holds across cultures.

8. Method

8.1. Participants

A total of 40 participants took part in the study in a window between December, 10th 2021 and May, 30th 2022. Participants were recruited via anonymous links either by posting the surveys on social networks (Facebook, Twitter) or spreading the questionnaires through the research team's extended network of acquaintances. English was the native language of all the participants, who were naïve as to the experiment's purpose. Their participation was voluntary and not reimbursed. We decided to include a sample of 20 participants per each survey to recruit a number of participants comparable to Study 1.

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9. Materials and procedure

To prevent participants from fatiguing effects, we split the sample of words into two different surveys. Each survey was composed of 40 different words (20 abstract and 20 concrete) to be rated across the three following dimensions: Valence, ESC, and Pleasantness. The two surveys had the same structure, but the 40 words to be rated were different.

Since the surveys to be compiled were two, a sample of 40 participants was needed, 20 for each survey. A total of 74 participants were originally contacted, but 34 of them were excluded because they did not complete the questionnaires, likely because of their length (34 participants, 45.95% of the original sample). Of the final sample of 40 participants, 20 participants (15 females and 5 males; *M age* = 30.8 years, *SD* = 12.89) performed the ratings of the first 40 words; the remaining 20 (13 females and 7 males; *M age* = 34.75 years, *SD* = 15.94) performed the second ratings on the other 40 different words. The study was conducted in accordance with the Declaration of Helsinki guidelines. Ethics permission was granted by the Ethics Committee of the Psychology Department at Sapienza University of Rome (Prot. n. 0001040–16/11/2020). Participants were informed of the general purpose of the study. Each survey provided informed consent.

The study was implemented on Psytoolkit (Stoet, 2010, 2017), in two independent surveys to avoid fatigue effects. Each one presented 20 abstract and 20 concrete words that participants were required to rate.

ACs selected from Villani et al.'s (2019) database were counterbalanced for the four subclusters identified in the database and randomly assigned to one of the two survey ratings. Accordingly, 10 physical, spatio-temporal, and quantitative concepts; 10 philosophical and spiritual concepts; 10 concepts related to the self and social concepts; and 10 emotional and inner state concepts were selected. The 40 CCs were selected from Montefinese et al.'s (2014) database. The surveys required for each concept a rating score for the three dimensions of interest: Valence, Pleasantness, and ESC. The procedure was the same as Study 1.

All data, scripts, and analyses are available at https://osf.io/tq3nb.

10. Results

10.1. The advantage of AC vs. CC on ESC holds in English

In order to verify whether the advantage of AC vs. CC on the ESC dimension holds in an English sample, we performed a linear mixed-effects model. The model ($R2C = 0.46$) included ESC as dependent variable, Category of Concepts (abstract, concrete) as fixed factor, and participants and words as random intercepts. The model showed a main effect of Category of Concepts $F(1,214) = 14.657$, $p < 0.0001$, with ACs ($M = 4{,}79$, $SE = 0.205$) rated significantly higher on ESC as compared with CCs ($M = 4.12$, $SE = 0.205$, $t(77) = 4.141$, $p < 0.0001$), (see Supplementary Figure S4).

Then, as for the Italian sample, we investigated whether the effect was modulated by the following dimensions: Pleasantness, Valence, and Familiarity. To avoid multicollinearity, we computed correlations among the continuous predictors to be entered into the model. Valence and Pleasantness were highly correlated ($R = 0.75$, $p < 0.0001$), moreover, Familiarity was correlated with Valence ($R = 0.14$, $p < 0.0001$) and with Pleasantness ($R = 0.17$, $p < 0.0001$). For this reason, we performed three different models with ESC as dependent variable, Category of

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Concepts as fixed effect, and random intercepts for words and participants, varying for the continuous predictors. In the first one, we entered Valence as continuous predictor (M1); in the second model we entered Pleasantness as a continuous predictor (M2); finally in the third model we entered Familiarity as continuous predictor (M3).

10.2. M1

The model ($R2C = 0.46$) with Valence as a continuous predictor yielded a main effect of the Category of Concepts $F(1,529.04) = 32.022$, $p < 0.0001$, and Valence $F(1,1183.54) = 71.155$, $p < 0.0001$.

The main effects of Category and Valence were better explained by the two-way interaction Category × Valence $F(1,1248.31) = 14.599$, $p < 0.0001$.

Simple slope analysis revealed that the slopes of AC (*LCI* 0.0671 – *UCI* 0.223) and CC (*LCI* 0.2821 – *UCI* 0.461) were significantly different from zero as a function of the factor Valence. The pairwise difference between the simple slopes of AC and CC as a function of Valence was significant (estimate = −0.227, $SE = 0.0596$, $t(1249) = -3.807$, $p < 0.0001$). The higher the ratings of concepts in Valence, the higher the ratings in the Easiness of Starting a Conversation dimension, the less the difference between AC on CC (see Supplementary Figure S4).

10.3. M2

The model ($R2C = 0.49$) with Pleasantness as a continuous predictor yielded a main effect of Category of Concepts $F(1,453.86) = 37.845$, $p < 0.0001$ and Pleasantness $F(1,1040.54) = 54.160$, $p < 0.0001$. The main effects were better explained by the two-way interaction Category × Pleasantness $F(1,1130.75) = 18.366$, $p < 0.0001$.

Simple slope analysis revealed that the slopes of AC (*LCI* 0.0158 – *UCI* 0.167) and CC (*LCI* 0.2479 – *UCI* 0.411) were significantly different from zero as a function of the factor Pleasantness. The pairwise difference between the simple slopes of AC and CC as a function of Pleasantness was significant (estimate = −0.238, $SE = 0.055$, $t(1137) = -4.269$, $p < 0.0001$). The higher the ratings of concepts in Pleasantness, the higher the ratings in the Easiness of Starting a Conversation dimension, the less the difference between AC on CC (see Supplementary Figure S5).

10.4. M3

The model ($R2C = 0.49$) with Familiarity as a continuous predictor yielded a main effect of Category of Concepts $F(1,1150.4) = 12.3699$, $p = 0.0004$ and Familiarity $F(1,1589.2) = 110.9192$, $p < 0.0001$. The main effects were better explained by the two-way interaction Category × Familiarity $F(1,1564.8) = 4.8518$, $p = 0.0277$.

Simple slope analysis revealed that the slopes of AC (*LCI* 0.189 – *UCI* 0.379) and CC (*LCI* 0.334 – *UCI* 0.480) were significantly different from zero as a function of the factor Familiarity. The pairwise difference between the simple slopes of AC and CC as a function of Familiarity was significant (estimate = −0.123, $SE = 0.0558$, $t(1565) = -2.200$, $p = 0.028$). The higher the ratings of concepts in Pleasantness, the higher the ratings in the Easiness of Starting a Conversation dimension, the less the difference between AC on CC (see Supplementary Figure S6).

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In conclusion, the emotional–experiential dimensions positively predicted the ESC but did not explain the advantage of ACs over CCs.

10.5. Self-Sociality subcluster is rated higher compared to all the other subclusters on the ESC dimension also in an English sample

We also explored in the English sample whether specific ACs' semantic subclusters identified by Villani et al. (2019) differ on the ESC dimension. So, we performed a model ($R2C = 0.47$) with ESC as dependent variable, Subclusters of Concepts as a fixed factor, and participants and words as random intercepts. The model showed a main effect of Subcluster $F(4,78.11) = 5.768$, $p < 0.0004$. Tukey post hoc comparisons indicated that Self-Sociality concepts ($M = 5.16$, $SE = 0.219$) were rated significantly higher in ESC as compared with CCs ($M = 4.12$, $SE = 0.203$, $t(79.7) = 3.873$, $p = 0.002$). As in the Italian sample, the subcluster which seems to favor starting a conversation is the Self-Sociality (see Supplementary Figure S7).

11. Discussion

In the current study, we investigated whether starting a conversation with an abstract rather than a CC is perceived as easier.

To this aim, we asked participants to rate AC and CC, on the ESC dimension, along with other classical and less-explored conceptual dimensions. We predicted that ESC might be related to how much the meaning of a word can be negotiated/discussed –(ON); how much we need the others' contribution to validate the meaning of a word (SM, Villani et al., 2019)]; how much we feel confident in mastering the meaning of the word (WC), and how much it is easy to think of a context for each word (CA, Schwanenflugel et al., 1988). Results show that regardless of being abstract or concrete, the more a concept was rated as pleasant, positively valenced, and familiar, the easier it was to start a conversation with it. More importantly, participants judged it easier to start a conversation with an AC compared to a CC. The lower the Familiarity, the higher the advantage of AC compared to CC in the ESC dimension. We also found that ACs scored higher on SM and ON, and lower on CA and WC. Indeed, we might need the others' contribution more to master ACs (Fini et al., 2021; Villani et al., 2019) and they might trigger more discussion and debates (Mazzuca & Santarelli, 2022) compared to concrete ones. On the other hand, we feel more confident in mastering CCs (Mazzuca et al., 2022) because they are easier to understand and offer a clear, imaginable context/situation as referent (Schwanenflugel et al., 1988) compared to ACs.

Overall, the ESC dimension seems better explained by emotional–experiential components resulting from the combination of Familiarity, Pleasantness, and Valence, extracted with the PCA. Regardless of concepts being abstract or concrete, the higher the Familiarity and Pleasantness, the more positive the Valence, the higher the ESC. When looking at the difference between AC and CC on the ESC dimension, the lower the emotional–experiential ratings, the higher the advantage of AC over CC. The advantage of ACs over CCs in the ESC dimension was also confirmed by a hierarchical cluster analysis, in which two clusters of concepts were identified. The first included mostly ACs with high scores on SM and ON, and the second included mostly concrete words with high scores on CA, WC, and Familiarity. These two

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clusters did not differ for Pleasantness and Valence. By investigating which kind of semantic subclusters most contributed to the advantage of ACs in the ESC dimension, it emerged that Self-Sociality and emotional concepts were those evaluated as easier to start a conversation with. Crucially, their predominance was not explained by Familiarity.

The advantage of AC on CC in the ESC dimension was also replicated in an English sample with another set of stimuli. The subclusters that scored higher in the ESC were again Self-Sociality and the Emotional concepts. The Self-Sociality subcluster significantly differed from the concrete subcluster, while the emotional one showed a tendency in the same direction.

11.1. ACs "afford" conversations

The role of conceptual semantics in *how* we use the concepts during real social exchanges has been poorly investigated. Here, through a rating study, we found that ACs are perceived as better "affording" conversations. The results obtained with an Italian sample generalize to an English-speaking sample. Indeed, ACs were evaluated as easier to start a conversation with than concrete ones. Why might ACs facilitate conversations?

ACs seem to evoke linguistic experiences to a larger extent, as shown by evidence on activation of the mouth motor system during ACs acquisition and processing. Furthermore, they evoke more uncertainty, as revealed by judgments of lower confidence (Mazzuca et al., 2022) and by a higher number of uncertainty-related expressions (Villani et al., 2022).

Conversations might be not only the prerequisite for ACs' acquisition but also the optimal scaffolding to discuss, negotiate, and master complex meanings and to find an intellectual validation.

In previous work, we argued that ACs elicit prosocial behavior due to their indeterminate character (Borghi, 2022; Fini & Borghi, 2019). In this rating study, we consistently found that people feel less confident in knowing their meaning, tend to rely more on others to understand their meaning, and believe their meaning is more debatable and open. This might explain why people tend to think it is easier to start a conversation with ACs. However, our results suggest that such an explanation is not complete. Indeed, we found in both the Italian and the English sample that, among ACs, the kinds of concepts with which it is easier to start a conversation are Self-Sociality concepts (i.e., "politeness," "art," "mood"), the ACs which are more related to social matters, and that are more "embodied" than other ACs (Villani et al., 2019).

One can speculate that two alternative explanations are at play. The first leads to starting a conversation from matters more related to sociality. Others would therefore be perceived as people with whom to share experiences. This explains both the higher scores in ESC of AC over CC and the advantage of Self-Sociality concepts over the other ACs. Another, and possibly concurrent, mechanism is more linked to the intellectual role others might play. This mechanism might contribute to explaining the advantage of AC over CC in starting a conversation. We might engage in conversations and dialogs with others when we need their intellectual support to understand better complex concepts, including the more abstract and less-embodied ACs.

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Recent results (Villani et al., 2022) of a study in which participants had to respond to sentences simulating a conversation with an acquaintance indicated that Philosophical and Spiritual concepts and Physical Space Time and Quantity concepts seemed to contribute to fuel the conversation over time. Participants were keen to continue the conversation, asking for more turns when the conversation was about Philosophical and Spiritual concepts and Physical Space Time and Quantity concepts. Based on this evidence, we are akin to think that the previously described mechanisms might pertain the relation between ACs' subclusters (see Villani et al., 2019) and conversational dynamics in different ways. Self-Sociality concepts might favor starting a dialog, by pointing directly to emotional and psychological states, which are part of conventional wisdom and by avoiding opportunities for conflicts and polarizations. Philosophical and Spiritual concepts and Physical Space Time and Quantity concepts might, instead, lead participants to extend the dialog, thanks to intense intellectual exchange.

The emotional–experiential component (Familiarity, Valence, Pleasantness) extracted with the PCA impacts the ESC dimension. The more a concept is familiar, positively valenced, and pleasant, the higher the ESC.

Importantly, although such a component seems to play a crucial role in explaining overall the ESC dimension, it does not explain the advantage of AC over CC in the same. As attested by the hierarchical cluster analysis, ACs are included in a cluster characterized by high scores on SM, ON, and ESC, while CCs are included in a cluster characterized by high scores on WC, CA, and Familiarity. Crucially, regardless of Familiarity, Valence, and Pleasantness, ACs are rated higher in the ESC than CCs.

Finally, three aspects deserve attention. The first one is that the stimuli selection was performed by avoiding too negatively valenced words; this implies that by exploiting a full range of emotional words, the emotional–experiential dimensions might override the advantage of ACs over CCs.

The second is that future behavioral studies need to explore the results further. Operationalizing the same experimental question in a lab setting will clarify whether the advantage of ACs over CCs in prompting a dialog also occurs during a real conversation. Moreover, we asked participants to rate "decontextualized" words and that we still do not know whether a number of factors can impact conversational dynamics. For example, different environmental features like affordance richness, outdoor vs. indoor spaces, and personality traits might predict the words we choose to start a verbal exchange with others.

12. Conclusion

ACs (specifically Self-Sociality) are evaluated to ease the starting of a conversation compared to CCs. This effect is not explained by emotional–experiential dimensions, that is, Familiarity, Pleasantness, and Valence. We suggest that it is instead well captured by the social grounding of ACs (see WAT theory, Borghi et al., 2017, 2018, 2019), which might extend to their use and, more generally, to the pragmatic of communication. Gathering knowledge about new conceptual pragmatic dimensions might be particularly useful for an adequate linguistic stimuli selection in more ecological interactive paradigms to study conversational dynamics.

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Supplementary material. To view supplementary materials for this article, please visit https://doi.org/10.1017/langcog.2023.3.

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Competing interests. The authors declare none.

Ethical approval. The study was conducted in accordance with the 1964 Helsinki Declaration. Ethics permission was granted by the Ethics Committee of the Psychology Department at Sapienza University of Rome (Prot. n. 0001040–16/11/2020). Participants were informed of the general purpose of the study. Each survey provided informed consent.

References

Banks, B., Borghi, A. M., Fagier, R., Fini, C., Jonauskaite, D., Mazzuca, C., Montalti, M., Villani, C., & Woodin, G. (2022). Consensus paper: Current perspectives on abstract concepts and future research directions. (in press)

Barca, L., Burani, C., & Arduino, L. S. (2002). Word naming times and psycholinguistic norms for Italian nouns. *Behavior Research Methods, Instruments, & Computers*, 34(3), 424–434.

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. *J StatSoftw*. 2015 Oct; 67(1):1–48.

Borghi, A. M. (2022). Merging affordances and (abstract) concepts. In *Affordances in Everyday Life: A Multidisciplinary Collection of Essays* (pp. 113–121). Cham: Springer International Publishing

Borghi, A. M., Barca, L., Binkofski, F., Castelfranchi, C., Pezzulo, G., & Tummolini, L. (2019). Words as social tools: Language, sociality and inner grounding in abstract concepts. *Physics of Life Reviews*, 29, 120–153.

Borghi, A. M., Barca, L., Binkofski, F., & Tummolini, L. (2018). Abstract concepts, language and sociality: From acquisition to inner speech. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 373 (1752), 20170134.

Borghi, A. M., & Binkofski, F. (2014). *Words as social tools: An embodied view on abstract concepts* (Vol. 2). Springer.

Borghi, A. M., Binkofski, F., Castelfranchi, C., Cimatti, F., Scorolli, C., & Tummolini, L. (2017). The challenge of abstract concepts. *Psychological Bulletin*, 143(3), 263.

Borghi, A. M., Flumini, A., Cimatti, F., Marocco, D., & Scorolli, C. (2011). Manipulating objects and telling words: A study on concrete and abstract words acquisition. *Frontiers in Psychology*, 2, 15.

Borghi, A. M., & Tummolini, L. (2020). Touch me if you can: The intangible but grounded nature of abstract concepts. *Behavioral and Brain Sciences*, 43, E123.

Borghi, A. M., & Zarcone, E. (2016). Grounding abstractness: Abstract concepts and the activation of the mouth. *Frontiers in Psychology*, 7, 1498.

Bradley, M. M., & Lang, P. J. (1999). Affective norms for English words (ANEW): Instruction manual and affective ratings (Vol. 30, No. 1, pp. 25–36). Technical report C-1, The center for research in psychophysiology, University of Florida.

Campbell, J. I., & Thompson, V. A. (2012). MorePower 6.0 for ANOVA with relational confidence intervals and Bayesian analysis. *Behavior Research Methods*, 44(4), 1255–1265.

Chouikhi, H., Charrad, M., & Ghazzali, N. (2015). A comparison study of clustering validity indices. In *2015 global summit on computer & information technology (GSCIT)*, IEEE pp. 1–4.

Cohen, J. (2013). *Statistical power analysis for the behavioral sciences*. Routledge.

Connell, L., & Lynott, D. (2012). Strength of perceptual experience predicts word processing performance better than concreteness or imageability. *Cognition*, 125(3), 452–465.

Davis, C. P., Altmann, G. T., & Yee, E. (2020). Situational systematicity: A role for schema in understanding the differences between abstract and concrete concepts. *Cognitive Neuropsychology*, 37, 142–153.

Deacon, T. W. (1998). *The symbolic species: The co-evolution of language and the brain* (Vol. 202). WW Norton & Company.

Della Rosa, P. A., Catricalà, E., Vigliocco, G., & Cappa, S. F. (2010). Beyond the abstract—Concrete dichotomy: Mode of acquisition, concreteness, imageability, familiarity, age of acquisition, context availability, and abstractness norms for a set of 417 Italian words. *Behavior Research Methods*, 42(4), 1042–1048.

Diveica, V., Pexman, P. M., & Binney, R. J. (2022). Quantifying social semantics: An inclusive definition of socialness and ratings for 8388 English words. *Behavior Research Methods*, 1–13.

Dove, G. (2009). Beyond perceptual symbols: A call for representational pluralism. *Cognition*, 110(3), 412–431.

Dove, G. (2011). On the need for embodied and dis-embodied cognition. *Frontiers in Psychology*, 1, 242.

Dove, G. (2014). Thinking in words: Language as an embodied medium of thought. *Topics in Cognitive Science*, 6(3), 371–389.

Dreyer, F. R., & Pulvermüller, F. (2018). Abstract semantics in the motor system?–An event-related fMRI study on passive reading of semantic word categories carrying abstract emotional and mental meaning. *Cortex*, 100, 52–70.

Dunbar, R. I. (1998). The social brain hypothesis. *Evolutionary Anthropology: Issues, News, and Reviews*, 6(5), 178–190.

Fini, C., Bardi, L., Bolis, D., Fusaro, M., Lisi, M. P., Michalland, A. H., & Era, V. (2023). *The social roots of self development: from a bodily to an intellectual interpersonal dialogue* (pp. 1–13). Psychological Research.

Fini, C., & Borghi, A. M. (2019). Sociality to reach objects and to catch meaning. *Frontiers in Psychology*, 10, 838.

Fini, C., Era, V., Da Rold, F., Candidi, M., & Borghi, A. M. (2021). Abstract concepts in interaction: The need of others when guessing abstract concepts smooths dyadic motor interactions. *Royal Society Open Science*, 8(7), 201205.

Fini, C., Zannino, G. D., Orsoni, M., Carlesimo, G. A., Benassi, M., & Borghi, A. M. (2022). Articulatory suppression delays processing of abstract words: The role of inner speech. *Quarterly Journal of Experimental Psychology*, 75(7), 1343–1354.

Ghio, M., Vaghi, M. M. S., & Tettamanti, M. (2013). Fine-grained semantic categorization across the abstract and concrete domains. *PLoS One*, 8, e0067090.

Gilead, M., Trope, Y., & Liberman, N. (2020). Above and beyond the concrete: The diverse representational substrates of the predictive brain. *Behavioral and Brain Sciences*, 43, e121.

Granito, C., Scorolli, C., & Borghi, A. M. (2015). Naming a lego world. The role of language in the acquisition of abstract concepts. *PloS One*, 10(1), e0114615.

Harpaintner, M., Trumpp, N. M., & Kiefer, M. (2018). The semantic content of abstract concepts: A property listing study of 296 abstract words. *Frontiers in Psychology*, 9, 1748.

Jollife, I. T. (2010). *Principal component analysis*. Springer.

Kuhn, M., & Wickham, H. (2018). tidymodels: Easily install and load the 'tidymodels' packages. Retrieved from https://CRAN.R-project.org/package=tidymodels

Lê, S., Josse, J., & Husson, F. (2008). FactoMineR: An R package for multivariate analysis. *Journal of Statistical Software*, 25(1), 1–18.

Lenth, R., Singmann, H., Love, J., Buerkner, P., & Herve, M. (2019). Package 'emmeans'.

Mazzuca, C., Falcinelli, I., Michalland, A. H., Tummolini, L., & Borghi, A. M. (2022). Bodily, emotional, and public sphere at the time of COVID-19. An investigation on concrete and abstract concepts. *Psychological Research*, 24, 1–12.

Mazzuca, C., Fini, C., Michalland, A. H., Falcinelli, I., Da Rold, F., Tummolini, L., & Borghi, A. M. (2021). From affordances to abstract words: The flexibility of sensorimotor grounding. *Brain Sciences*, 11(10), 1304.

Mazzuca, C., Lugli, L., Benassi, M., Nicoletti, R., & Borghi, A. M. (2018). Abstract, emotional and concrete concepts and the activation of mouth-hand effectors. *PeerJ*, 6, e5987.

Mazzuca, C., Majid, A., Lugli, L., Nicoletti, R., & Borghi, A. M. (2020). Gender is a multifaceted concept: Evidence that specific life experiences differentially shape the concept of gender. *Language and Cognition*, 12(4), 649–678.

https://doi.org/10.1017/langcog.2023.3 Published online by Cambridge University Press

Mazzuca, C., & Santarelli, M. (2022). Making it abstract, making it contestable: Politicization at the intersection of political and cognitive science. *Review of Philosophy and Psychology*, 1–22.

Mohammad, S. (2018). Obtaining reliable human ratings of valence, arousal, and dominance for 20,000 English words. In *Proceedings of the 56th annual meeting of the association for computational linguistics (volume 1: long papers)* (pp. 174–184).

Montefinese, M., Ambrosini, E., Fairfield, B., & Mammarella, N. (2014). The adaptation of the affective norms for English words (ANEW) for Italian. *Behavior Research Methods*, 46(3), 887–903.

Prinz, J. J. (2012). *Beyond human nature. How culture and experience shape our lives*. Penguin.

Rumiati, R. I., & Foroni, F. (2016). We are what we eat: How food is represented in our mind/brain. *Psychonomic Bulletin & Review*, 23(4), 1043–1054.

Schwanenflugel, P. J., Harnishfeger, K. K., & Stowe, R. W. (1988). Context availability and lexical decisions for abstract and concrete words. *Journal of Memory and Language*, 27(5), 499–520.

Shea, N. (2018). Metacognition and abstract concepts. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 373(1752), 20170133.

Singmann, H., Bolker, B., Westfall, J., & Aust, F. (2015). Package 'afex'.

Stoet, G. (2010). PsyToolkit - A software package for programming psychological experiments using Linux. *Behavior Research Methods*, 42*(4)*, 1096–1104.

Stoet, G. (2017). PsyToolkit: A novel web-based method for running online questionnaires and reaction-time experiments. *Teaching of Psychology*, 44*(1)*, 24–31.

Villani, C., Lugli, L., Liuzza, M. T., & Borghi, A. M. (2019). Varieties of abstract concepts and their multiple dimensions. *Language and Cognition*, 11(3), 403–430.

Villani, C., Lugli, L., Liuzza, M. T., Nicoletti, R., & Borghi, A. M. (2021). Sensorimotor and interoceptive dimensions in concrete and abstract concepts. *Journal of Memory and Language*, 116, 104173.

Villani, C., Orsoni, M., Lugli, L., Benassi, M., & Borghi, A. M. (2022). Abstract and concrete concepts in conversation. *Scientific Reports*, 12(1), 1–15.

Warrington, E. K., & Shallice, T. (1984). Category specific semantic impairments. *Brain*, 107(3), 829–853.

Wauters, L. N., Tellings, A. E., Van Bon, W. H., & Van Haaften, A. W. (2003). Mode of acquisition of word meanings: The viability of a theoretical construct. *Applied Psycholinguistics*, 24(3), 385–406.

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