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Ciascuno degli autori degli articoli che compaiono nel presente numero è responsabile in toto del proprio scritto che rispecchia esclusivamente il suo pensiero.

*At the Edge of Graspability:
Substances and Aggregates*

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1. Introduction

Our hands are the best body tools for grasping and manipulating physical entities. However, there are some entities that do not offer a secure and stable hand grasp: these are the substances and the aggregates.

Substances (e.g. liquids) and aggregates (e.g. sand) differ from one another, and from the other concrete entities, not only for their physical characteristics, but also for the way humans conceptualise them (as the morpho-syntax of the nouns denoting them often reflects) with relation to a scale of individuation, which ranges from substances (e.g. liquids) to granular aggregates (e.g. flour, sand) to collective aggregates (e.g. small grains and fruits) to individuals (Clausen et al. 2010). The status of an entity on this scale is the result of several factors, such as the ease of distinguishability of its constituent elements, the size of such elements, the spatial and/or temporal contiguity among them, and the canonical mode of interaction with the entity (Wierzbicka 1988, Middleton et al. 2004). The way in which concrete entities are perceived and conceptualised is likely to determine not only the morpho-syntactical form of words denoting them (mass vs. count nouns), but also the way in which humans act on them. Substances and aggregates do not afford an easy and secure manual grasp, and an instrument is often used instead (we usually take water with glasses, jugs, etc.).

This paper explores the relation between the cognitive and perceptual aspects of substances and aggregates and the kind of grasp they require. It will focus on how the reference to the effector of the grasp (the entity that comes in contact with the object) is realised in the linguistic description of the grasp of substances and aggregates. In particular, the aim of this work is to investigate whether the position of such entities on a scale of individuation influences the way in which the effector of a possible grasp is referred to in an action description task.

2. Methods

The work here presented is part of a larger experiment, described in De Felice (2015, in press). It has been conducted on 30 students who were asked

to observe, on a pc monitor, a series of images representing graspable entities (artefacts, humans, natural kinds, and substances/aggregates), and to describe, for each picture, how they would have grasped the entity. All interviews have been transcribed. In this paper, I present and discuss the results from the four visual stimuli constituting the category of substances and aggregates: flour, pumpkin seeds, sand, water (cf. Fig. 1).



Figure 1. The visual stimuli representing substances and aggregates.

From the 120 linguistic descriptions of grasp provided by the 30 informants for these four stimuli, all the references to the effector of the grasp, defined as the entity that is linguistically presented as the one that comes in contact with the object, were extracted. For instance, in a description such as *prenderei la farina con due dita*, <due dita> has been marked as the effector of the grasp.

Then, all words (nouns, adjectives, and adverbs) adopted to denote the effector of the grasp were classified according to a set of semantic categories: HAND (the lemmas *mano* and *pugno*); MERONYM (parts of the hand, e.g. *dita*); SPACE (spatial relations referred to the hand, e.g. *destra*); QUANTITY (number words and quantifiers, e.g. *due (mani)*); PERCEPTIVE (adjectives that express perceptive properties of the hand, e.g. *(mano) concava*); SIMILES (nouns denoting a concrete entity evoked to describe the hand shape, e.g. *(mano messa a) cucchiaino*); INSTRUMENT (nouns denoting the instrument effector of the grasp, e.g. a cup, a container).

3. Results

Table 1 collects all data extracted and classified for the four stimuli.

	<i>Water</i>	<i>Flour</i>	<i>Sand</i>	<i>Pumpkin seeds</i>	<i>Tot.</i>	<i>%</i>
<i>HAND</i>	27	28	31	12	98	39.2
<i>MERONYM</i>	4	6	6	35	51	20.4
<i>SPACE</i>	3	1	5	2	11	4.4
<i>QUANTITY</i>	12	13	13	13	51	20.4
<i>PERCEPTIVE</i>	1	-	-	-	1	0.4
<i>SIMILES</i>	19	7	8	-	34	13.6
<i>INSTRUMENT</i>	2	2	-	-	4	1.6

Table 1. Classification of words used to denote the effector of the grasp (tot. 250).

It is evident, from the high frequency of lexical elements of the HAND, QUANTITY and MERONYM categories, that in most cases the effector of the grasp is the hand or the hand's parts. In particular, the most frequent grasp



type described for the water is with one or two cupped hands, whereas for the flour and the sand it is with the whole hand; only few participants named the fingers, describing a grasp performed with “all the fingers” or a pinch grip. On the contrary, for the pumpkin seeds, most participants indicated a pinch grip and named the fingers; however, there are also a few mentions of a grasp performed with the whole hand or with a bimanual grasp.

What is most interesting is the high number of references to containers. All the lexemes of the SIMILES category, except two occurrences of *utensile*, denote containers evoked to describe the form of cup-shaped hands (e.g. *userei le mani a ciotola*, or *farei una conca tipo con la mano*, referred to water and sand respectively). Moreover, in four cases (cf. the INSTRUMENT category), the containers are presented as the real instrument with which the entity is grasped: *mi aiuterei con una tazza* (referred to flour), *con un bicchiere, fondamentalmente* (referred to water).

4. Discussion

Considering the data from the SIMILES and the INSTRUMENT categories together, we notice that containers are named most frequently for water. This is hardly surprising: water is a liquid substance, made of continuous and visually undistinguishable minimal elements. Therefore, it cannot be grasped with the hands unless they are cupped, i.e. shaped as (and linguistically assimilated to) a container; otherwise, a real container must be used.

Flour and sand are solid aggregates, made of minimal particles that are continuous and hardly distinguishable from one another, and humans do not usually interact with such elements. Therefore, these entities can be grasped with a pinch grasp or with a power grasp (a fistful of flour or of sand), but still hands are often assimilated to containers (in 7 and 8 cases respectively). Only in the case of flour, the particles of which are smaller than those of sand, a real container is indicated as the instrument with which the grasp can be performed (as for the water stimulus).

In the mound of pumpkin seeds, discrete physical objects are easier to distinguish than the grains of sand, and humans often interact with them, eating the seeds one by one. Most participants considered the mound of seeds as an aggregate of individuals: containers are never mentioned, whereas the fingers are very often indicated as effectors of a pinch grasp directed to the single seeds. However, there is also a competing grasp description reflecting a different conceptualisation of the object-stimulus. A few informants described a whole hand grasp: in such cases, the mass interpretation, fostered by the presence of a “mound” of seeds, overcomes the individuation of the single elements.

In referring to the cup-shaped hands, participants actually attributed the properties of an instrument to their hand. The kind of property that a cupped hand shares with a real cup is not only at the visuo-perceptual level, but also, and crucially, at the functional level. Both the hand and the container are the instrument through which the grasp may be realised. It is the functional property of objects such as *coppa* (nine times), *contenitore*, *cucchiaio*, *mestolo* (three occurrences each), and notably “instrument” (*utensile*, two occurrences), more than their perceptual properties, what allows the comparison with the hand.

The number of explicit mentions of containers seems to reveal a

tendency that can be represented as a hierarchy:

water < flour < sand < pumpkin seeds

The more a stimulus is on the left part of the hierarchy, the more likely the participants are to resort to lexical expressions denoting instruments, especially containers, either in similes and analogies relative to the hand (for the water, the flour, the sand), or even indicating them as the effector of the grasp described (for the water and the flour). Such hierarchy well complies with a scale of individuation such as the one presented in Clausen et al. (2010), which ranges from the less individuated entities to the most individuated ones (substances < aggregates < collectives < individuals).

5. Conclusions

The data obtained from a grasp description task, conducted using four kinds of substances and aggregates as visual stimuli, reveal that the more the entity to be grasped gets far from affording an easy, secure, and stable manual grip (and the less it is individuated), the more the hand acquires the properties of the instrument artefact most suited for the circumstances, i.e. a container. A language rich in similes and analogies reflects the overlapping between these two spheres, that of a hand-effector and that of a container-effector. This process may even lead to a complete substitution of the body part-effector with an instrument artefact. Notably, this only happens for the two stimuli (flour and water) that afford the most difficult, if any, manual interaction.

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