Conceptualizing plurality as bounded areas in space –

Reduplication and diagrammatic iconicity as semiotic forces in multimodal language use

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Abstract

This paper addresses the conceptualization and expression of plurality in speech and gesture. For this purpose, a specific gestural pattern will be focused on that is tightly linked with the verbal marking of plurality in spoken language use. Based on this phenomenon, two arguments will be presented: First, it is suggested that gestures themselves express plurality via reduplication, which, grounded in the principle of diagrammatic iconicity, carries the basic structure of "more form = more meaning". Secondly, it is proposed that speech and gesture work together to construe plurality as multiple bounded areas in space (Langacker 2008, Talmy 2000) and as such provide a multimodal structure to the experience being communicated. With this focus, the paper underlines the particular relevance of reduplication and diagrammatic iconicity for building patterns and meaning in the verbal *and* the visual modality.

Keywords

Multimodality, gesture, grammar, plural, conceptualization, diagrammatic iconicity, reduplication

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Introduction – Plurality in natural languages

All natural languages have the means to distinguish between singular and plural and are thus able to set apart single and several entities. This distinction is expressed by the grammatical category number and, depending on the language, applies to nouns, pronouns, adjectives, demonstratives or determiners. Grammatical number is marked either on the word form via inflectional processes or syntactically through congruence. Unmarked forms thereby usually express singular, whereas plural forms are marked and derived from morphological processes such as affixation or reduplication.

Reduplication, understood as the „systematic repetition of phonological material within a word for semantic or grammatical purposes" (Rubino, 2005, p. 11), is particularly in Non-Indo-European languages a structurally and functionally quite diverse and productive morphological means with plural marking being the most frequent function cross-linguistically (Mattes, 2014) (see Table 1).

total reduplication	partial reduplication
Indonesian: *orang* ‚man/human' > *orang-orang* ‚men/humans'	French: *fille* ‚girl' > *fi~fille* ‚little girl'
Tausug: *dayang* ‚lady' > *dayangdayang* ‚princes'	Illokano: *ag-bása* ‚read' > *ag-basbása* ‚reading'
	German: *klimper* > *klimpimper*

Table 1: Examples for reduplication[1]

Plural marking via reduplication is considered to be diagrammatically iconic. Diagrammatic icons, a subclass of iconic signs according to Peirce, are signs "which represent the relations – mainly dyadic – of the parts of the one thing by analogous relations in their own parts" (Peirce, 1960 CP 2.277)[2].

> A complex word is thus a diagram of its semantic and morphological structure, a sentence is a diagram of syntactic and semantic form, a text is a diagram of its topical and thematic structure, a narrative is a diagram of its plot, and a dissertation is a diagram of the thesis it develops (Nöth, 2008, p. 90).

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[1] Structurally, reduplication is classified into *total reduplication* (repetition of a whole stem or root) and *partial reduplication* (partial repetition of a whole stem or root. The repeated element is either put in front or behind the basis or is inserted into the basis (see Table 1 and Rubino (2005). Examples taken from (Rubino, 2005; Schindler, 1991).

[2] Saussures notion of relative motivation is included in Peirces concept of diagrammatic icons (De Saussure, Bally, & Sechehaye, 2001, p. 156ff)

Contrary to cases of imagistic iconicity, that is a simple type of a physical similarity relation between form and meaning of signs, the iconicity in diagrams arises from the similarities that exist in relations of successions of complex signs and the expressed complex relational conceptualization (Jakobson, 1966). Diagrams represent only basic relations or proportions of an object and may be understood as schema or construction. As a result, diagrams do not need to resemble the object. Their similarity only exists regarding the relation of their parts[3]. Diagrammatic iconicity is thus "not representing but *designing* similarity" (Bauer & Ernst, 2015, p. 44 italics in original; see also Stjernfelt, 2007). Because diagrams reduce the event to basic features, they provide the observer with "information about elements and structures, relations and proportions that constitute an event" (Bauer & Ernst, 2015, p. 46) and as such build the basis for further patterns and implication processes (*diagrammatic reasoning* Peirce, 1960). "By direct observation of it other truths concerning its object can be discovered than those which suffice to determine its construction" (Peirce, 1960 CP 2.279).

As a structural principle, diagrammatic iconicity is productive on a range of different levels of the language system. The linear sequence of signs, for instance, is used to express succession in space and time, continuity, duration or motion (Pusch, 2001). In the famous example *veni-vidi-vici* given by Jakobson, for instance, the temporal order of the verbs mirrors the order of the narrated events and thus exhibits diagrammatic iconicity on the level of syntax. In many Indo-European languages, diagrammatic iconicity on the morphological level, as exemplified in the gradual increase in phonemes in comparisons such as *high-higher-highest*, for instance, mirrors the gradation in the signified (Jakobson, 1966, p. 27). In many spoken and signed languages, plural marking is diagrammatic iconic regarding the semantic class 'more': More of the same form (quantity) leads to an increase in complexity (reduplicated word form is semantically more complex). This is illustrated by verbs, for instance, in the Austronesian language Chamorro, in which the perfective is expressed in a less complex form, whereas as the imperfective is expressed in a segmentally more complex form (*mañocho* – 'have eaten' vs. *mañochoocho* – 'are eating') (Stolz, 2007b, p. 329). Accordingly,

> every reduplicated word form which expresses any kind of quantity change with respect to the meaning of the base (i.e. intensity, plurality, diminution, etc.) is an example of "iconic" reduplication, because the change of quantity in meaning corresponds to a change of quantity in form. (Mattes, 2014, p. 121)

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[3] For a discussion of the notion of iconicity and problematic aspects of its discussion in linguistics see for instance (Nöth, 2008).

The paradigm case for the reduplication and the notion of diagrammatic iconicity is the singular-plural distinction in nouns. Plural nouns are usually marked, that is, they receive more morphological features and are thus more complex. The singular, however, due to less morphological material is less complex.

Following along the general lines of thought outlined above, the present paper expands the perspective on the notion of plurality by turning to multimodal language use. In particular, the paper addresses the conceptualization and expression of plurality in speech and gesture. For this purpose, a specific gestural pattern will be focused on that is tightly linked with the verbal marking of plurality in spoken language use. Based on this phenomenon, two arguments will be presented: First, it is suggested that gestures themselves express plurality through reduplication, which, grounded in the principle of diagrammatic iconicity, carries the basic structure of "more form = more meaning". Secondly, it is proposed that speech and gesture work together to construe plurality as multiple bounded areas in space (Langacker 2008, Talmy 2000) and as such provide a multimodal structure to the experience being communicated. With this focus, the paper underlines the particular relevance of reduplication and diagrammatic iconicity for building patterns and meaning in the verbal *and* the visual modality. It is assumed that the abstract principle of multiple settings via copying in reduplications and the principle of diagrammatic iconicity is a basic semiotic force taking effect both in speech and gesture. Thus it provides the basis for similar formal, conceptual and semantic structures in the verbal and the visual modality.

Before discussing the joint expression of plurality in speech and gesture, the following chapter presents the gestural pattern to be discussed in more detail. Based on the results of a corpus-study, it will be shown how gestures, through the means of iteration, are able to build units of different complexity and, in particular, build complex gestural meanings (*reduplicative constructions*). Afterwards, these reduplicative constructions are discussed in relation to the spoken utterance and the verbal marking of plurality. This is being exemplified through the use of several examples showing that the multimodal expression of plurality essentially rests upon the principle of reduplication and diagrammatic iconicity and leads to a multimodal conceptualization of plurality as multiple bounded areas in space. Based on these results, the paper subsequently discusses the notion of diagrammatic iconicity in studies on the visual modality.

Reduplication and pluralization in gestures

Quite early, the repetition of linguistic material is discussed as the most basic pattern to build complex units in speech (see Pott, 1862). Whereas these studies assumed a holistic approach examining the repetition of sounds, words and sentences as a whole, today's studies usually distinguish two main areas of interest: repetition and reduplication. Both types reflect similar phenomena that arise through an analog principle, namely the repetition of linguistic material. Yet, depending on the type of linguistic material that is affected, the means of repetition assumes various functions on different linguistic levels. Whereas repetitions are usually assigned to the area of syntax and discourse, reduplications are understood as a morphological process (Stolz, 2007a). In spoken and signed languages, repetitive structures are an elementary syntagmatic linguistic means for the construction of structures and units on all levels of the language system. Accordingly, they are used as a stylistic and pragmatic resource for the expression of viewpoint (Kotschi, 2001). In language acquisition, rhythmic structures arising from the doubling of syllables are a basic pattern tool for experiencing, embodying and acquiring phonological and prosodic structures of an individual language (Dressler, Dziubalska-Kołaczyk, Gagarina, & Kilani-Schoch, 2005). As reduplications, repetitions fulfill versatile functions in the morphology of spoken and signed languages (Hurch, 2005; Wilbur, 2005).

However, repetitive structures are not only a tool for building patterns in speech but rather constitute a basic means of sign constitution in many sign systems, such as music, art and film, for instance. Also in non-human sign systems, such as birdsongs, the waggle-dance of honey bees or in the vocal and gestural communication of non-human primates, repetitive patterns play a major role as a means of building structures (e.g., Liebal, Pika, & Tomasello, 2006). Also for co-speech gestures repetition has been accounted for as a basic method for pattern building. Already in the 19th century, in his treatise on gestures in Naples, de Jorio (de Jorio, 1832/2000) discusses possible meanings and functions of gestural repetitions. Stating that "gestures are not only adopted to express isolated ideas, but also ideas connected together" (de Jorio 2000: 398), he identifies three different ways in which gestural repetitions are used:

a) Gestures can be repeated because they are parts of a single action, such as in swearing or praying.

b) They may deliberately connect one idea with the other and alter the verbal meaning either through the context in which they are performed or through a modification of their execution.

c) Gestural repetitions may also express grammatical notions. Modifying the gestures through enlargement, increase or amplification of its qualities expresses the superlative, whereas reducing the movement conveys the diminutive.

Similarly, modern gesture research discusses the diverse potential of gestural repetitions. McNeill (1992), for instance, states that enhancing the gestures' quality marks contrast or may function as diminution. Gestural repetitions may also indicate durativity and iterativity of enacted actions (e.g., Becker et al., 2011; Müller, 2000). Furthermore, through the recurrence of gestural form features, so called catchments, gestural repetitions tie together thematically related parts of discourse (McNeill, 2005, p. 115ff). Based on Kendon's (1980, 2004) account of the linear and hierarchical structure of co-speech gestures[4], Fricke argues in her multimodal grammar for the assumption that gestures may build infinite gestural strings via the principles of iteration and coordination (Fricke, 2012, p. 165). In particular she argues for two types of sequences that achieve different relevance for the construction of complex gesture units due to articulatory features: On the one hand, these are sequences in which the successive meaningful movement units of the gestures (*strokes*) are separated via preparatory movements (*preparations*). On the other hand are sequences in which the individual strokes follow each other without preparatory movements in between (*stroke-stroke*). For these sequences, Fricke furthermore proposes three types: a) repetitions, in which the individual strokes do not vary in their articulatory features and instantiate the same form features, b) reduplications, in which the individual strokes differ in one form feature, the position of the hands in the gesture space, and c) variations, in which only the hand shape remains constant across the individual strokes, while all other features change (Fricke, 2012, p. 167ff).

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[4] Co-speech gestures are structurally and hierarchically organized in time. On the one hand, gestural sequences can be segmented into individual movement phases (*gesture phases*) that assume different functional relevance. The meaningful part of the gesture – the part people rely on in their interpretation of a gesture – is the *stroke*. In order to perform a stroke, the hands need to prepare for its execution during the phase referred to as *preparation*. The stroke may be followed by a *retraction*, a phase in which the hands relax and move back into a *rest position*. On the other hand, co-speech gestures build units of different sizes and complexities ranging from smaller *gesture phrases* to larger *gesture units* (see also Bressem & Ladewig, 2011; Kita, van Gijn, & van der Hulst, 1998). Based on particular articulatory features and succession of gestural movement phases, different types of gestural units arise. When meaningful movement phases occur without intermediary preparation phases, the resulting gestural unit possesses a stronger degree of connection and thus a more complex gestural meaning than strokes that are separated through preparatory phases (Bressem, 2012; Fricke, 2012; Kendon, 2004; Kita et al., 1998).

Based on a corpus-linguistic study and the analysis of 182 repetitions from 42 speakers, Bressem (2012) shows that co-speech gestures, by making use of the principle of iteration, build two types of repetitive sequences: 1) *Iterations,* in which the repetition of gestural material results in the reiteration of one and the same gestural meaning and does not lead to the creation of a complex gestural meaning. 2) *Reduplications*, in which the repetition of gestural material results in the creation of a connected reduplicative construction and thus a complex gestural meaning.[5] This cognitive-semantic classification of repetitive gestural sequences is grounded in aspects of form, meaning and structure as well as in a different semantic and grammatical relevance of such sequences in multimodal utterances. As the focus in the present paper is on gestural reduplications, the following section will be limited to a discussion of the aforementioned reduplicative constructions. For a more detailed discussion of both types of repetitions see Bressem (2012, 2014, 2015).

Before examining the gestural pattern in detail, three examples will be introduced exemplifying paradigmatic cases of the phenomenon to be discussed. The examples are taken from a video corpus consisting of 30 hours of German discourse ranging from naturalistic conversations, TV-discussions, political speeches and parliamentary debates, game shows, and academic lectures to experimental data.[6] The data was analyzed from a form-based and cognitive-linguistic perspective on the study of body-movements (Ladewig & Bressem, 2013; Müller, 2010, 2013). The annotation and analysis of the examples used an ELAN based linguistic annotation system (Bressem, Ladewig, & Müller, 2013). Through a combination of a qualitative and quantitative perspective, repetitive sequences in gestures were identified.

The first example is taken from a German TV show "alpha-Forum" in which personalities from politics and economy, science and society, religion and culture are interviewed for 45 minutes.[7] In the example to be discussed, the mathematician Christian Hesse, tells the story of the inventor of the chess game, a wise Brahmin, who thought the game to his maharajah. As a reward, the maharajah granted the Brahmin one wish. The Brahmin demanded „one grain of wheat for the first field of the chess board, two for the second, four for the third, and always the double amount" (*ein Weizenkorn für das erste Feld auf dem Schachbrett, zwei für das zweite, vier für das dritte und immer die doppelte Anzahl)*.

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[5] The terms 'iteration' and 'reduplication' will be used to refer to the identified patterns of gestural repetitions. Accordingly, the paper distinguishes between the underlying principle of iteration and the arising patterns that have been introduced according to the definition.

[6] For detailed information on how the examples were gathered, coded and analyzed see Bressem (2012).

[7] For further information on the TV show, please visit http://www.br.de/fernsehen/ard-alpha/sendungen/alpha-forum/index.html.

und$_1$	**im**$_2$	**mer**$_3$ *die doppelte Anzahl*
and$_1$	**al**$_2$	**ways**$_3$ the double amount

The flat hand with the palm facing lateral is moved three times along the horizontal axis form left to right in arced movements.

Example 1: "double amount" [8]

In conjunction with mentioning the individual numbers, the speaker produces a series of pointing gestures through which he visually highlights the amount specified in the verbal utterance. Subsequently while uttering „and always the double amount" (*und immer die doppelte Anzahl*), he executes a gestural reduplication in which the right flat hand with a palm lateral orientation is moved along the horizontal axis from left to right in three arced movements. The three strokes of the repetition align with the conjunction 'and' and the first and the second syllable of the adverb 'always' (see example 1).

The second example is taken from the parliamentary debate of the German Bundestag on July 3rd 2015, in which the parties discuss retirement age in Germany. The politician Markus Kurth from the German Party "Bündnis 90/Die Grünen" explains a proposal submitted by his party on how to create more flexibility for employees to retire at different ages while allowing part time jobs. This proposal, Kurth points out, allows employees to be more flexible and self-determined in designing the last years of their career and, in particular, allows for employees to work past the usual retirement age. Thus the proposal includes "also those employees that are healthy and fit and would like to work past the retirement age and can do so" (*auch die Beschäftigten die tatsächlich das Glück haben fit zu sein, die über die Regelaltersgrenze hinaus arbeiten möchten und das auch können*). While uttering "also those employees" Kurth produces a gestural reduplication consisting of three strokes during which the right flat hand with a lateral orientation moves along the horizontal axis from left to right in small arced movements. The individual strokes align with the adverb 'also', the pronoun 'these and the first and second syllable of the noun 'employees' (see example 2).

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[8] The word or syllables in bold mark the individual stroke phases of the gestural sequence. The subscripted numbers mark the respective stroke phase.

auch₁	*die:₂*	*Beschäf₃tigten*
also₁	**those₂**	**emplo₃yees**

The flat hand with the palm facing lateral is moved three times along the horizontal axis form left to right in arced movements.

Example 2: "employees"

The third example is taken from a corpus of natural occurring conversations[9] in which two speakers talk about a range of different topics. In the present example, the participants discuss a seminar for hairdressers in which ME has recently participated. After explaining that the coach started to babble about haircuts and their compositions, speaker ME points out that all this information can also be found in textbooks. While saying "well you can read through the single steps" (*kannste dir ja immer die einzelnen Schritte durchlesen*), ME produces a series of strokes co-occurring with the first syllable of the adverb 'individual', the second syllable of the adverb and the noun 'steps' and the prefix of the verb 'read through'. Using a hand shape with fingers 2-5 flapped down and a PD orientation, ME executes three strokes with an arced movement away from the body. The hands thereby successively move from a position above downwards.

einzel₁nen₂	*schritte₂*	*dU₃RCHlesen*
single₁	**steps₂**	**read₃** through

The hand with the fingers flapped down is moved downwards along the vertical axis in three arced movements.

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[9] I would like to thank Silva Ladewig for providing me with this example.

Example 3: "steps"

All three examples display cases of gestural repetitions, which are characterized by particular features found in the gestural movement sequence, form parameters of the hands and the *Gestalt* arising from it. All of them exhibit a length of 2–3 strokes that follow each other without interruption and no preparatory phases in between. When meaningful movement phases (strokes) – the part people rely on in their interpretation of a gesture – occur without intermediary preparation phases, the resulting gestural unit possesses a stronger degree of connection and thus a more complex gestural meaning than strokes that are separated through preparatory phases (see also footnote 4). As gestural reduplications are exclusively composed of strokes, a particularly high degree of connection arises between the individual gesture phases. This connection is strengthened by certain form characteristics. During the execution of the strokes, the speaker's hands either move along the horizontal axis from the center to the side (example 1 and 2) or along the vertical axis from above to below (example 3). Throughout the hands maintain a particular form Gestalt: The shape of the hand, the orientation of the palm and the movement pattern remain constant. [10]

Based on these structural characteristics (preference for shorter sequences along with the consistency of form parameters), gestural repetitions are perceived as *Gestalts* following the principles of Gestalt theory. As unconscious perceptual mechanisms, Gestalt principles allow us to construct wholes or Gestalts out of incomplete perceptual input (Koffka, 1962; Köhler, 1935; Wertheimer, 1925) They "represent the most basic level of **constituting** experience" (Croft & Cruse, 2004, p. 63 emphasis in original) thus providing a structure to and constraining our experience.

> There are wholes, the behaviour of which is not determined by that of their individual elements, but where the part-processes are themselves determined by the intrinsic nature of the whole. (Wertheimer, 1999, p. 4)

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[10] Similar to sign languages of the deaf, co-speech gestures are articulated with the hands that are formed and oriented in a particular way and moved and positioned freely in the space around the speaker's body. For the description of this simultaneous complexity, sing linguistics makes use of phonological parameters, bundles of meaning differentiating features, consisting of hand shape, orientation, movement and position in gesture space (Klima & Beluggi, 1979; Stokoe, 1960). In an adapted form, these parameters are also used for the description of gestural forms and allow for the identification and segmentation of the simultaneously occurring articulatory features of co-speech gestures (see Bressem, 2013 for an overview of existing notational schemes)

Gestalt theory distinguishes altogether seven principles regarding the visual perception. The superordinate and most essential one is the *law of simplicity* or the *law of Prägnanz*, which states that single elements are combined into Gestalts based on concise visual input. In combination with the remaining principles (*Figure and Ground, proximity, similarity, closure, continuity and smallness*), they guide our visual perception leading to the emergence of structured wholes. In the case of gestural repetitions discussed above, a range of different principles is at the work out of which similarity and smallness may be specifically important. Due to the principle of similarity, which states that entities that share characteristics will be perceived as belonging together, the repetitive sequence is perceived as distinct yet similar elements of a Gestalt. Due to the consistency of form features, a strong similarity between the individual strokes is created assuring for their perception as a coherent unit. This perception is supported by the principle of smallness, stating that smaller entities tend to be seen as Figures against a larger Ground. Individual strokes are thus perceived as Figures against the Ground of the whole repetitive sequence, whereas the Gestalt itself (repetitive sequence) makes the perception of the individual strokes possible. (For a more detailed discussion of Gestalt principles in gestural repetitions see Bressem 2012.)

Although most of the form features remain the same, the individual strokes differ from each other in one particular form feature, namely the position of the hands in gesture space. They either move from the center to the right periphery (examples 1 and 2) or from above down towards the center of the speaker (example 3). Yet in all cases, the position in gesture space does not have a concrete meaning: the different areas in front of the speaker's body do not mime perceived relations between objects in the real world. Due to the fact that the parameter 'position' does not represent relations in the real world, it is semantically free and can be charged with other functions: The individual strokes of the repetitive sequences solely mark individual areas in gesture space. These are understood as different yet similar areas in space based on particular form characteristics (gestural form features, length of unit) through which temporal and spatial contiguity and similarity between the individual strokes become apparent and thus a coherent structure or Gestalt arises. The semantic unloading of the form parameter 'position' thus allows for a structural function in the case of gestural reduplications: Through spatial cohesion, perceived spatial relations and structural relations between the successive strokes emerge (Sowa, 2005). Moreover, a diagrammatic iconic relation between the different strokes arises in which relations of forms are mapped onto relations of meanings: More of the same gestural form leads to a change in the semantic complexity. Consequently, the gestural

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sequence is iconic in relation to quantity and complexity: one space vs. many spaces (see Figure 1).

diagrammatic iconic relation

auch
also

die
those

Beschäftigten
employees

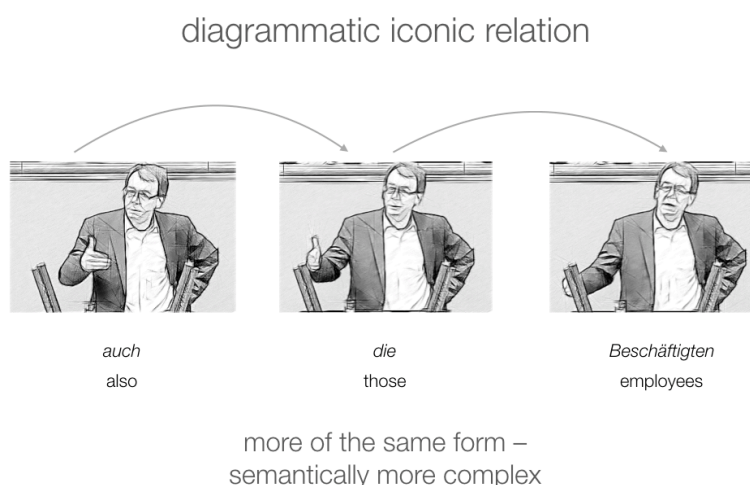more of the same form –
semantically more complex

Figure 1: Diagrammatic iconic relation in gestural reduplication

Due to all of these aforementioned characteristics, the gestural repetition described above can be considered as a coherent and complex gestural unit, a *gestural reduplication*. The repetition of gestural material results in the creation of a complex gestural meaning, namely the conceptualization and construal of plurality as different areas in gesture space. This notion is based on the meaning of the initial form but is yet different from it (Stolz, 2008) as the value of the individual strokes is less complex than the one expressed by all strokes of the repetitive sequence. The construction thus carries a more complex meaning and is a complex sign schema which "possesses an independent meaning that, as a whole, carries an independent meaning respectively discourse function [...] that is describable as a 'potential for semiosis' also independently of particular contexts of utterances" (Schneider, 2015, p. 133, translation JB). It is "an entity in its own right, usually with emergent properties not inherited or strictly predictable from the components and the correspondences between them" (Langacker 2008: 164).

The meaning of the complex gestural unit thereby essentially rests upon its diagrammatic iconicity by which, similar as in spoken or signed languages, more of the same form is used for the construal and expression of plurality. Diagrammatic iconicity thus serves as a means for buildings patterns and schemas in co-speech gestures and hence allows for the creation of constructions. With this reasoning, we follow Fricke (2012), who, based on Saussure, postulates that relative motivation is not only a matrix for grammatical constructional rules in

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spoken languages but also a means of typification and an indicator for rudimentary processes of grammaticalization in co-speech gestures. (See section 5 for a more detailed discussion.) Yet, diagrammatic iconicity is not only relevant for the level of gestural sign creation but also for the perception and multimodal construal of plurality. The following section will now bring into focus the interplay of speech and gesture in the multimodal expression of plurality.

Multimodal conceptualization of plurality

When speakers display the gestural reduplicative pattern described in the section above, they talk about abstract concepts and entities and about *multiple* instances of these concepts and entities. In the three examples given for instance, the speakers indicate the "double amount" of grains (example 1), "the employees" who want to work longer (example 2) and the "individual steps" needed for a haircut (example 3). When executing the gestural pattern, speakers verbally express the multitude of concrete entities such as humans, particular places or actions. Abstract concepts, such as in example 1 for instance, are less frequent. In most cases, the gestural pattern co-occurs with count nouns, such as in examples 2 and 3 given. Instances with mass nouns are documented but less often (example 1). However regardless of whether the gestural reduplications appear with count or mass nouns, linguistic means are used to individuate the concepts and entities talked about: Almost equally the nouns are preceded by numerals or quantifiers. Determiners are used but only in few cases. The gestural reduplicative pattern thereby either encompasses the nouns or (noun) phrases or spans the whole sentence.

Considering the semantic interplay of speech and gesture, it can thus be stated that both speech and gesture express the meaning of plurality and as such work together towards the creation of a multimodal understanding of plurality. Plurality is expressed and marked verbally as well as expressed in the gestural reduplicative construction. Yet taking into account the interplay of speech and gesture and the specifics of the meaning expressed by each modality, a particular construal of plurality emerges: one in which speakers conceptualize abstract entities and concepts multimodally as vertically or horizontally individuated entities and as multiple bounded areas in space (Langacker 2008, Talmy 2000). This construal is an achievement of both, the verbal and gestural modality, with each of them contributing particular aspects.

Grammatical descriptions of number in spoken languages distinguish nouns into count nouns or mass nouns. Count nouns refer to discrete entities with well-defined limits whereas mass

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nouns refer to a homogenous undifferentiated unit without an intrinsic shape and precise limits (Langacker, 2008, p. 129ff). Accordingly, count nouns typically refer to physical objects (e.g., grains, books, computer) or humans and animals (e.g., women, employees, cows). Mass nouns, however, usually denote physical substances (e.g., water, petrol, gold). The distinguishing feature for differentiating them is the notion of *bounding*, the existence or non-existence of precise limits (Langacker, 2008, p. 147ff; Talmy, 2000, p. 50ff) (see Figure 2). This feature also results in morphological and syntactic differences. Mass nouns lack the number opposition and are thus not inflectionally marked for plural. Count nouns however can be pluralized. Syntactically they also differ in the contexts in which they can be used. Count nouns can be preceded by numerals (e.g., one woman), indefinite determiners (e.g., a woman) or quantifiers (e.g., many women). Mass nouns, due to the fact that they cannot be counted and as such cannot be pluralized, do not combine with numerals and the indefinite article yet occur with indefinite quantifiers (e.g., much water, little gold). Thus, "grammatical properties are symptomatic of underlying conceptual differences" (Langacker 2008, p. 131). Plurality in nouns is conceptually furthermore connected to the state of dividedness, referring to a quantity's internal segmentation (Talmy 2008: 50ff). A quantity may either be *discrete* by having internal interruptions and breaks (e.g., forest) or it may be *continuous* when exhibiting no internal separation (e.g., water) (see Figure 2). Accordingly, due to differences in the quantities disposition, differences in the grammatical and lexical elements may arise such that the internal continuity of 'water' may be discretized as in "particles of water".
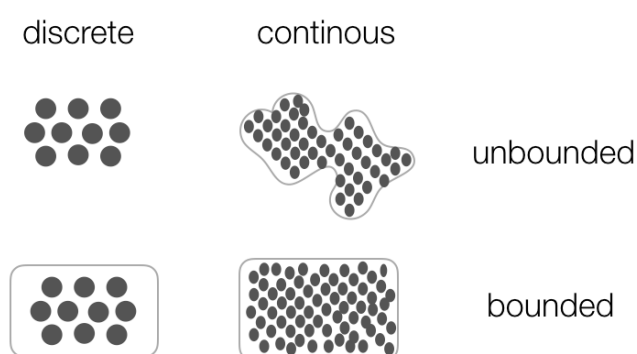

Figure 2: schematization of quantity (adapted from Talmy 2000: 59)

Therefore, the distinction between count and mass nouns is not a strict lexical opposition but rather dependent on the speaker's construal of a scene. It may lead to conceptual operations resulting in changes in the categorization and the grammatical behavior such that 'gold', for

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instance, may function as a count noun when referring to a particular type of gold rather than the substance (Langacker 2008, see also Talmy 2000: 50ff).

As shown in the examples above, plural is marked in speech grammatically and syntactically depending on whether the speaker expresses the multitude of physical objects and entities with count or mass nouns. Yet, in all cases, the grammatical and syntactic means allow for an individuation of multiple concepts and entities regardless of whether the entities and concepts, such as physical objects and substances, themselves are to be understood as discrete and limited. In gestures also a discretization is achieved. Here, entities and concepts are construed as multiple areas in space along the vertical or horizontal axis through which furthermore the notion of boundedness is visually manifested and embodied via the Gestalt arising from the repetitive sequence. Accordingly, dependent on the modalities abilities, an individuation of entities is achieved. As a result, a verbo-gestural conceptualization of plurality as multiplex, discrete and bounded (Talmy 2000) (see Figure 3) emerges.
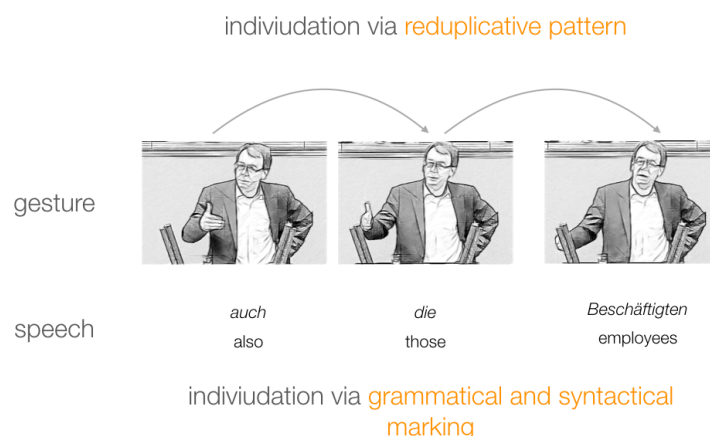

Figure 3: multimodal construal of plurality

Although the gestural pattern is less frequently used in relation with mass nouns, it shows that the multimodal structure used to conceptualize plurality remains the same irrespective of the grammatical category. Accordingly, multimodal data seem to reflect a pattern described for spoken languages: Grammatical meaning is not strictly lexical but dependent on the conceptualization and the construal in the moment of speaking (Langacker 2008; Talmy 2000).

The two preceding sections have shown that the multimodal conceptualization of plurality as multiple bounded areas in space rests upon a particular gestural pattern used with speech.

First of all it was argued that gestures are able to express to plurality through the process of reduplication, which is grounded in the principle of diagrammatic iconicity and carries the basic structure of "more form = more meaning". Secondly, it is grounded in the respective plural marking via grammatical and syntactical means in speech. Due to the particular gestural pattern in combination with the particularities of the verbal utterance, it is suggested that speech and gesture work together to construe plurality in this particular manner. Concluding it is thus suggested that plurality, understood as an entities quantity, is a conceptual phenomenon that is based on particular principles of perception, reification and conceptualization. These are reflected in grammatical and lexical categories as well as in the structural patterns, such as reduplication and diagrammatic iconicity, used in the modalities to express them.

Concluding remarks – Diagrammatic iconicity in the visual modality

This paper has presented an analysis of marking plurality in multimodal language use by taking into account the particular interplay of speech and gesture. The multimodal pattern that was presented is one way for conceptualizing the plurality in speech and gesture but the question remains whether other multimodal patterns might be observed. In particular, considering the use of the gestural pattern with the expression of mass nouns in speech, it remains open whether the pattern holds across an even larger database. As such, the analysis might serve as a basis for further investigations into the nature and conceptualization of plurality in cognition, language and gesture.

Apart from the notion of plurality and its multimodal expression, the paper underlines the particular relevance of reduplication and, in particular, diagrammatic iconicity as a semiotic force for building patterns and meaning in the verbal *and* the visual modality. As such, the paper supports Jakobson (1971, p. 350f) in his view that diagrammatic iconicity may be a universal or modality independent means of sign constitution. This assumption is further strengthened, by considering the results of the paper in relation to the marking of plurality in sign languages. In sign languages, plural on nouns is often marked through reduplication (Klima & Beluggi, 1979; Steinbach, 2012). The German Sign Language, for example, expresses plural by means of *sidewards* or *backwards reduplication*: The movement is repeated along the horizontal or sagittal axis and the hands are located in different places in gesture space. The sign for 'children' in German Sign Language, for examples, is articulated by moving the flat hand with the palm facing downwards in small arced movements

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horizontally from the center of the body outwards (Pfau & Steinbach, 2005). Considering the gestural reduplicative pattern presented in this paper, a comparable use is observable. In gestural reduplications similar changes of movements, locations in gesture space and length of gestural sequences can be documented. Gestural reduplications thus seem to use an analogous structural principle (reduplication of movement, change of position in gesture space) for a similar function (indication of plurality). Because gestures and signs use the same modality, these commonalities may not be surprising, yet nevertheless put forward the question whether gestural forms may be the basis for processes of grammaticalization as was shown, for instance, by Wilcox (2007) for modal verbs and the marking of aspect in American Sign Language. Considering the phenomenon of reduplication and marking of plurality in the visual modality, it may be constitute a modality independent means that is not only at work in spoken and signed languages (Pfau & Steinbach, 2006) but also in co-verbal gestures. Moreover, the assumption may be put forward that the horizontal and vertical alignment in different spaces is a strategy for expressing plurality in the visual modes. Following Stolz (2008), we assume that the abstract principle of multiple settings via copying in reduplications is a basic semiotic means that lays the ground for similar form-based and semantic structures in the verbal and visual modality. Along with the principle of diagrammatic iconicity it allows for commonalities in speech, sign and gesture. Overlaps in the spoken and visual modality are thus grounded in a general principle that is based on the copying of segments, their structural arrangement and the iconicity arising from it. (For a more detailed discussion of this argument see Bressem, 2012; 2015.)

With the topic of plural marking, the present paper has discussed a cross-linguistically wide spread use of diagrammatic iconicity. The question that arises from this study and the afore-discussed assumption is what further areas and functions of diagrammatic iconicity in co-verbal gestures can be found. A range of studies already highlights the importance of this type of iconicity in gestures. Mittelberg (2006, 2008, 2013), for instance, shows that it is a basic principle structuring the systematic arrangements of gestural sings in discourse about spoken language grammar. In particular, three different modes come into play in meta-grammatical co-speech gestures: *image-iconic diagrams, relational diagrams* and *structural diagrams* (Mittelberg, 2006, p. 192ff.). Co-speech gestures visually represent conventional graphic diagrams, for example a tree structure diagrams, and as such can be understood as image-iconic diagrams. Relational diagrams are visible in gestures representing the structure of a sentence when the hands, for example, visually display a "string of words" by tracing a line. Such diagrammatic gestures

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tend to bring out the abstract, structural underpinnings of a sentence or a theoretical model of a sentence, that is to say, the organization rather than the content. It is thus a visual rendition of relational iconicity which spoken language cannot provide. (Mittelberg, 2006: 198)

Structural diagrams highlight principles of sign constitution in gestures and, in particular, the fact that gestural representations rest upon the abstraction and selection of particular features of the reference objects. Although this type of diagrammatic iconicity is less obvious, as Mittelberg (2006: 201) notes, it nevertheless reflects a basic characteristic of the semiotic nature of co-verbal gestures. Fricke (2014, 2015) also demonstrates the relevance of diagrammatic iconicity for the construction of (complex) gestural sign and shows that the construction of *kinesthemes*, "intersubjectively semanticized movement tokens whose similarity on the form level correlates with a similarity on the meaning level" (Fricke 2014: 1622) rests upon this principle. Kinesthemes, such as the flat open hand, often occur with particular variations of form that result in meaning differences. Müller (2004), for example, shows that the *flat open hand* carrying the semantic core of presenting, giving, showing may be varied depending on the particular movement pattern that is executed (e.g., up and down movement for listing arguments, circular motion for providing further arguments). A both handed execution of the flat open hand may be understood as resulting in the semantic feature of intensification. The meaning of intensification is based on diagrammatic iconicity arising between both hands (Fricke 2012, 2014). Similar as in the case of gestural reduplications expressing plurality presented in this paper, more on the expression side correlates with more on the meaning side. In the case of the *flat open hand*, this leads to an intensification of the meaning that is expressed by a one handed flat open hand. For kinesthemes such as the flat open hand, diagrammatic iconicity is thus a basic means for typification and an indicator of rudimentary processes of grammaticalization in co-speech gestures. A range of studies furthermore discusses the role of diagrammatic iconicity for the conceptualization of diverse cognitive processes and concepts. Enfield, for instance, underlines the significance of diagrammatic iconicity in visual representations of abstract kinship relations. He highlights that gestures and other bodily movements are used as "tools for diagramming thoughts on a rich three-dimensional virtual sketch space anchored in the body" (Enfield, 2009, p. 164). Similar as other authors, Enfield points out that gestures seem to be particularly apt at exploiting this type of iconicity. As a visual modality that uses three-dimensional space for its articulation and with the hands being three-dimensional, gestures carry characteristics that

allow them to turn abstract structures into observable ones by using this particular type of iconicity. Others highlight its importance for the conceptualization and expression of abstract thought such as observable in mathematical thinking, talking and gesturing about physics, music or architecture (Groninger, this volume; Krause, this volume; Roth, this volume; Zalamea, this volume) as well as joint communicative activities or problem solving (Mittelberg & Rekittke, this volume; Schüller & Mittelberg, this volume; Stjernfelt & Østergaard, this volume). A range of studies thus clearly shows that diagrammatic iconicity as a semiotic means plays a significant role in gestures for processes of sign constitution, pattern building and conceptualization. Further research along these lines may allow for better understanding of this type of iconicity in the verbal *and* visual modality. As such, it may identify further possible overlaps and commonalities between speech and gesture that allow for a better understanding of both modalities and their particular characteristics.

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