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For a systematic semantic classification of imitative prosody

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ABSTRACT

Imitative prosody (prosody miming word meanings) is an emerging field of study: associations between prosodic features and meanings is now well attested (Nygaard & al [1], Perlman & Cain [2]), and some theoretical explanations are given in terms of gestures (Fónagy [3], Perlman & al [4]), metaphors (Nygaard & al [1]), or blending (Auchlin [5]). In this paper, as an update of a previous work [6], we are working on the integration of the imitative function into the general prosodic system, the syntagmatic analysis of utterances, and theoretical linguistics (at this stage, mainly analogical and structural linguistics). In particular, we introduce semantic features, semantic chains and polysemy in the prosodic field.

Key words: prosody, sound symbolism, semantics, analogical linguistics, interpretative semantics, biological codes

1. Theoretical models: interpretative semantics and analogical linguistics

This paper is entirely theoretical. The motivation of forms leads to polysemy, which leads to contextual distinction and the consideration of three levels of paradigmatic classification (already established by the theory of interpretative semantics for verbal language). To simplify the approach, we will refer to archetypal theoretical examples (i.e., "obvious" and "invented" examples). To listen to a few hundred empirical examples in French¹ (and no doubt soon in English²), classified according to the concepts established here, the reader can refer to our works [6] and [7].

Interpretative semantics theory [8, 9] provides an account of the conditions of interpretation of the prosodic signs chosen by a speaker in an utterance, and proposes a classification of them. *Analogical linguistics* [10] helps to organize the typology of motivational facts (= that which is not arbitrary), which are at the core of the functioning of imitative prosody, if not of prosody in general.

1.1. The category levels and semantic chains of interpretative semantics

We refer to *interpretative semantics* to codify the interpretation of the prosodic sign in accordance with its context of appreciation, i.e., the elements co-present in the utterance (*syntagmatic* approach), and in accordance with the associated elements in the subject's linguistic competence (*paradigmatic* approach). This theory,

developed mainly by Rastier (cf. [9] for an introduction in English), is in the line of the structural linguistics of Saussure and Greimas, and we have extended it to the study of prosody (and in particular the prosodic signs associated with verbal content, primarily imitative). Rastier's project is to describe in semantic features the conditions of interpretation (a semantic feature to mark the regrouping of signs in a certain domain, for example). These semantic features are used to describe signs in their categories (on the paradigmatic axis), as well as signs in their associations on the utterance chain (on the syntagmatic axis). In addition, they can be used starting from the semantic feature itself (from the concept to the various signs containing it: *onomasiology*), or starting from the signs (from the signs to the concepts they express: *semasiology*, in particular to address the problem of *polysemy*). In our view, this framework makes it possible to organize a systematic description of imitative prosody, if not of prosody in general. The metalanguage of this theory will be slightly reduced.

The *lexicon* is defined at different paradigmatic levels. The minimal level is the *taxeme*, the small class of immediate oppositions. A *domain* contains a number of taxemes: these domains are paradigms of greater generality, bringing together lexical diversity under a theme (these domains are similar to those of dictionaries). Taxemes and domains are exemplified below. Finally, *dimensions* are paradigms regrouping signs according to fundamental (often dichotomous) oppositions in a given language (usually of grammar importance): for example, for verbal language, *singular* vs. *plural*, *potential* vs. *irrealis*, *concrete* vs. *abstract*, *animate* vs. *inanimate*. We will progressively explain

¹ Our doctoral dissertation combined an empirical and theoretical approach, and the categories were established on the basis of 200+ examples by professional French actors declaiming poetry.

² The two languages operating almost or totally in same way for the facts considered here, these facts being highly motivated.

how these categories can be transferred to prosody (and the advantages of such a transfer).

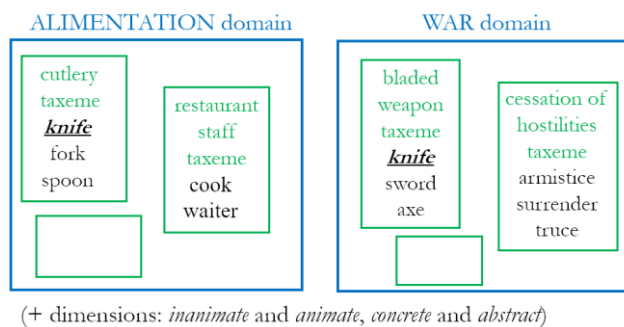


Figure 1: *Taxemes, domains and dimensions paradigms*

Isotopies refer to the repetition of the same semantic feature across two signs in close proximity on the syntagmatic axis, enabling their cohesion through this semantic chain. Thus, if *knife* is co-present with *cook*, a domain isotopy of *food* is established, while if it is co-present with *surrender*, the domain isotopy established is that of *war*. Isotopy thus makes it possible to select, for a polysemous term, the semantic profile that is consistent with the context. Isotopies can also be established between *distinctive* features (as opposed to *paradigms* regrouping features): for example a *+intense* isotopy between *pain* and *hunger*, even though these words belong to different semantic paradigms.

1.2. Analogical linguistics

Under the notion of *analogy*, a faculty considered primordial in the light of advances in cognitive science [11], this linguistic theory, developed mainly by Monneret [10], aims to systematically describe the links of *similarity* (or *resemblance*) that can exist between different linguistic elements. These elements are phonetic and phonological units, linguistic meanings (the signified and its semantic features), concepts and referents. These links of similarity can be *homogeneous* (between two phonological units, for example) or *heterogeneous* (between a phonological feature and a semantic feature, for example). This framework, merely sketched out here, offers the possibility of a more systematic understanding of *motivational* facts, i.e., non-arbitrary relations between elements of form and elements of meaning (i.e., *heterogeneous* analogies). *Homogeneous* analogies, in particular those involving categorization (shared semantic feature between two signs of the same paradigm) and cohesive relations (shared semantic feature between two signs by isotopy), will however be addressed using the theoretical framework of interpretive semantics.

2. Morphosemanticism: the motivation of prosodic forms

Within this framework of analogical linguistics, motivational facts are systematically identified and confronted. *Motivation* refers to that which is not arbitrary in the form-meaning relationship, and this broad field of study encompasses *sound symbolism*. However, as Monneret emphasizes [12, p. 8], sound symbolism is not only *iconic*, it can also be *indexical*. Indexicality and iconicity were defined by Peirce [13], then made more accessible to linguists by Jakobson [14]. According to Jakobson's

definition, while iconicity refers to a relationship of suggestive resemblance between form and meaning, indexicality refers to a relationship of "existential contiguity" of one to the other: for example, the form of a spontaneous cry is motivated by the emotion felt, its meaning, and this relationship is one of physiological necessity, not resemblance. As far as prosody is concerned, indexicality has been extensively studied by Ohala [15] and Gussenhoven [16], under the designation of *biological codes*, and for vocal emotions by K.R. Scherer and colleagues [17].

2.1. Indexicality and biological codes

The fundamental argument of *biological codes* is that facts of form-meaning motivation are found in many of the world's languages, and can be attributed to *physiological* constraints. Counter-examples do not contradict this so-called natural general tendency, and Gussenhoven acknowledges [16, p. 80] that linguistic evolution can distend or cancel out this motivational relationship. The code relating to the *breathing* constraint will associate high breath level, and consequently high melody, with the notion of rupture or novelty (paragraph attacks, non-active topics), and conversely low melodic level with completion (paragraph endings [16, 18]). A continuity at the beginning of a group will thus tend to be low (not a thematic break, e.g., topics already active [19]), while a continuity at the end of a group tends to be high (not a completion [20]). The *effort code* explains the tendency of many semantically intensive prosodic signs (emphases [20], focus [21], melism [22], vocal excitement [17]) to resort to melodic excursions and increases in loudness (leaving aside tempo, which is fast for vocal excitement, and slow for emphases). The *frequency code*, associated with attitudes encountered in the animal world (prey/predator and seduction/rejection relationships [15]) explains a variety of affects (low-pitched negativity and authoritativeness, high-pitched positivity and fragility), and in a more *grammaticalized* way, certain sentence modalities (high-pitched questions and low-pitched assertions [16]).

In our view, *imitative* prosodic signs are also derived from these biological codes, and more precisely, to a large extent, are a kind of *repurposing* of prosodic signs with other functions. According to the *effort code*, levels of emotional arousal, physiologically motivated in their form-meaning relationship [17], can be reused to imitate words expressing concepts of movement or force of agitation. Similarly, again according to the *effort code*, prosodic emphasis and attenuation can imitate different intensity-related concepts (but not all of them: for example, large/small size, and not large/small intelligence). According to the *frequency code*, negative or positive qualifications, motivated in their form, can be reused to imitate words relating to these oppositions (e.g., *heaven* and *hell*). This is what we shall try to organize into categories and conditions of interpretation. However, the motivation for these imitative functions is only partially *indexical*, and also relies on *iconicity*.

2.2. Imagic iconicity

According to Peirce's definition (i), image iconicity refers to the resemblance of a sign to the object it targets (another sign) [13], whereas according to Jakobson's definition [14] this process of resemblance is established between the form and the meaning of a sign. In the latter case, we suggest that it can be (ii) a general

resemblance: the sign's form perceptually evokes the sign's meaning, or (iii) a partial resemblance: within the prosodic sign, the form evokes part of the meaning. On this basis, we formulate three types of imagic iconicity for imitative prosody. (i) imitation proper: the prosodic sign evokes the object it targets (e.g., an emphasis positioned on "elephant" is interpreted as a vocal image of this word). (ii) this implies, internally to prosody, that the prosodic form is capable of signifying *big size*, which it does in the mode of a suggestive form-meaning resemblance. Only a few domains are intensively imitable: size (image of a large size), but not intelligence (*smaaaart* is a grammatical intensification, but does not sensitively evoke intelligence, whereas *biiiiig* sensitively evokes a growing size). (iii) more fundamentally, and arising from the effort code seen above, the form of emphasis sensitively evokes the very general concept of great intensity. It is this intensive semantic feature that can be transferred to various non-imitative (grammatical: insistence or intensification) or imitative meanings (great size, imposing strength, strong sonority, etc.), provided that the target word offers the necessary conditions (cf. i), and, for imitative uses, that the form can be an icon in the domains suggested by the target word (cf. ii: possible imitation in the domain of *size* and not in the domain of *intelligence*).

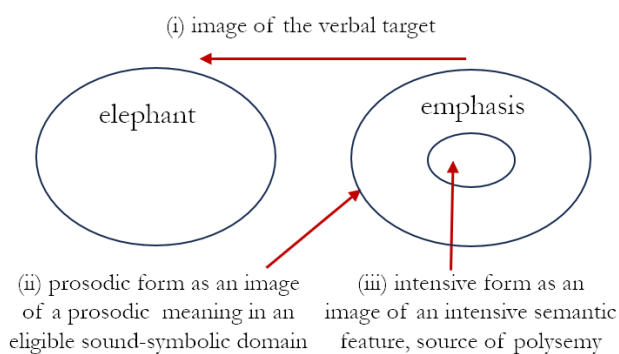


Figure 2: *Combination of three types of imagic iconicity*

2.3. Diagrammatic iconicity

Following Jakobson, while *imagic* iconicity designates a link of resemblance internal to the sign (between its form and its meaning), *diagrammatic* iconicity refers to a form-meaning resemblance between several signs [10, 14]. Given two signs, each with a form and a meaning, the relationship between their forms (of gradation, for example) is evocative of the relationship between their meanings (also of gradation). We propose four types of diagrammatic iconicity that may be of interest to the functioning of prosody.

Table 1: *Four types of diagrammatic iconicity*

Equative	=/=	Phon= ↔ Phon= ≈ Sem= ↔ Sem=
Privative	∅/+	Phon∅ ↔ Phon+ ≈ Sem∅ ↔ Sem+
Scalar	+/++	Phon+ ↔ Phon++ ≈ Sem+ ↔ Sem++
Polar	-/+	Phon- ↔ Phon+ ≈ Sem- ↔ Sem+

The table reads as follows: in an *equative* diagram, for example, partially equal forms evoke partially equal meanings. This is the

case for prosodic dimensions (cf. 4.1.), derived from biological codes (cf. 2.1.): e.g., various signs expressing the dimension of *newness*, or the dimension of *intensity* all share part of their form. Let's take again the example of *emphasis*, whose most expressive form combines the features of melodic excursion, volume increase and deceleration. Its motivation has already been examined according to the *biological code of effort* and as an *imagic iconicity*. Its motivation can also be examined according to these *four types of diagram*: (i) According to an *equative* diagram, emphasis shares some of its vocal features with other prosodic signs belonging to the intense dimension, such as focus or vocal excitation. (ii) According to a *privative* diagram, emphasis and its audible form is opposed to absence of emphasis and its null form in the *French accentual group scheme* (cf. *accent initial* [20]). (iii) According to a *scalar* diagram, emphasis is opposed to more extreme emphases, which is reflected directly in the form (*GOAAL* vs. *GOOAAAL*). (iv) According to a *polar* diagram, relevant to imitative prosody, emphasis opposes attenuation (vocal effort for *BIG*, and vocal attenuation for *small*). It should be noted that these diagrams are of the greatest interest for *categorization*: two (or more) signs of a paradigm are motivated in their relations, and this will contribute in the following sections to justifying the existence of prosodic *dimensions* and *taxemes*.

3. Semasiology: from signs to meanings

Paradigmatic semasiology lists the different meanings of the same sign, where imitation appears as one of the possible functions, and indeed where several types of imitation can emerge from a unique sign (e.g., the large size, large presence, etc. meanings of emphasis). *Syntagmatic semasiology* describes the conditions of actualization of these different possibilities, which can also amalgamate (cumulate). *Onomasiology* describes the conceptual proximity of this sign to other signs, via recourse to the same dimension, domain or taxeme (*paradigmatic onomasiology*), or via isotopic links with conceptually similar verbal content (*syntagmatic onomasiology*).

3.1. Paradigmatic semasiology: one sign, several classes

One of our main concerns is to describe the *imitative function* of prosody economically and in relation to the *general functioning* of prosody, rather than postulating *ad hoc* imitative forms (lists associating a form with a meaning), without association links with the same form (*polysemy* or *homophony*), or other meanings (*categorization*). The association links are notably made with vocal signs that are not imitative, but are more fundamental to the functioning of prosody, i.e. signs with grammatical or modal/attitudinal meanings (cf. next section). These differences in interpretation need to be codified. Let's take again the example of emphasis, a single polysemous sign, and categorize its different meanings (its different profiles in polysemous relation).

The same *taxeme*, or minimal paradigm of oppositions, contains *emphasis* and *attenuation* (cf. 2.3 *diagrammatic iconicity*), due to the motivation of their respective semantic cores (cf. 2.1. *biological effort code* and 2.2 *imagic iconicity iii*). The different *polysemous* imitative possibilities of these two signs are distinguished from each other by projecting into different *sound symbolic domains* eligible for the imitation of verbal content (cf. 2.2

image iconicity ii). These domains are not, of course, the same as the lexical domains (cf. 1.1): they are the domains in which sound symbolism is known to operate (size, strength, etc.), and within which these two imitative prosodic signs realize specific values (such as *small size* imitation for attenuation, *large size* imitation for emphasis). The domains proposed for this pair of signs, generally attested by studies on sound symbolism (cf. references in the abstract), are the *size* domain (where emphasis can, for example, imitate the word *tall* and attenuation the word *short*), *strength* domain (e.g., for the words *strong* vs. *weak*), *loudness* domain (e.g., *noisy* vs. *silent*), *quantity/weight* domain (e.g., *a lot* vs. *a few*), *presence* domain (e.g., *appear* vs. *disappear*), *resistance* domain (e.g., *hard* vs. *soft*). Other imitative prosodic signs, belonging to other taxemes, can also join these same domains of sound symbolism (cf. 4.1 *paradigmatic onomasiology* section).

3.2. Syntagmatic semasiology: activation of a profile by context

If various prosodic signs (e.g., emphasis, positive appreciation, low excitation) are polysemous, we need to consider the *contextual conditions* under which certain meanings are realized in an utterance, rather than the other possible meanings derived from the same form. Three stages of analysis, of increasing complexity, can be contemplated: (i) the mechanism of *selection* of a profile by the context (ii) the possibility of an *amalgamation* (accumulation) of several profiles in the interpretation (iii) and in the case of accumulation of profiles, the degree of *salience* of each in the interpretation.

(i) The contextual selection mechanism may be *prosodic* and/or *verbal*. In the case of strong arousal, for example, other prosodic features may impose an emotional interpretation (the Scherer school [17] having established that the same form of strong arousal is found across different families of emotions, it is the other prosodic features of these aroused emotions that distinguish them). However, other semantic profiles of this strong arousal form can be selected by the verbal context: the verbal description of a rapid movement (projection into the domain of *movement*), or of a brutal action (projection into the domain of *strength*).

(ii) As a second step, we can consider under which utterance conditions different profiles (grammatical and imitative) can accumulate, i.e., depending on the word *targeted* by the prosodic sign. Let's take the example of an emphasis targeting the word *large*. LAARGE is at the same time highlighted in its immediate context (*insistence* function), *intensively modified* (synonymous to a modifier such as *very*, i.e. *very large*) and imitated by the emphasis (*imitative image*). If the emphasis is applied to SMAALL, the word is highlighted and intensified (*very small*), but not imitated (it would indeed be imitated by the opposite form of its taxeme). Gradable words are prosodically intensifiable, but only some of them are imitable. Finally, a word like *table* cannot be intensified (not gradable) or imitated, it can only be highlighted.

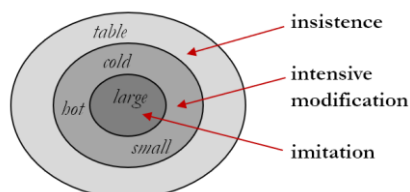


Figure 3: *Amalgamation of polysemous profiles*

(iii) In a third stage, the *amalgamation* (accumulation) approach can be refined by questioning the presumed preponderance of certain interpretations over others. In particular, we postulate a difference in treatment between *adjectives* and *nouns* (according to their prototypical semantics, i.e. not nouns derived from adjectives, such as *largeness*). Let's take the example of the voice indicating negative appreciation. Words like *bad* and *devil* are both imitable by this prosodic sign. The interpretation *very bad* (*intensive modification* function) may seem more salient in the interpretation than an image of the word *bad* (*imitative* function), while the imitative interpretation of *devil* (imaged representation) seems more salient than the intensification function (*a terrible devil*). This has to do with the fact that the adjective qualifies (unlike the noun), and thus this prosodic addition to the adjective amplifies the degree of qualification of the noun targeted by this adjective. This can be coded in terms of taxeme (minimal paradigm regrouping the opposite appreciation prosodic signs), dimensions (for the intensification meaning, alongside other signs belonging to this paradigm), and domains (for the imitative process). This is examined more thoroughly in the next section.

4. Onomasiology: from meanings to signs

The advantage of a technical classification such as the one we are proposing is that it organizes closely related facts that need to be disentangled: different types of form motivation, imitative functions vs. qualifying functions, but also semantic features common to several signs (*paradigmatic onomasiology*), and activated under certain contextual conditions (*syntagmatic onomasiology*).

4.1. Paradigmatic onomasiology: prosodic classification levels

It has been seen that Gussenhoven's *biological codes* [16] give rise to a variety of prosodic signs, sharing some of their form features and some of their semantic features. Similarly to the grammatical or modal/attitudinal dimensions of verbal language (cf. 1.1), prosodic *dimensions* can be proposed for these codes, which (i) distinguish prosodic signs within their taxeme (*polar diagrammatic iconicity*) and (ii) regroup prosodic signs belonging to different taxemes (*equative diagrammatic iconicity*).

Adapting [16] to the interpretative semantics theory, the *respiratory code* (also known as *production code*) leads to *completion* vs. *continuation*, *givenness* vs. *newness* dimension paradigms, the *frequency code* leads to *certainty* vs. *uncertainty*, *positive valence* vs. *negative valence* dimension paradigms, and the *effort code* leads to *high intensity* vs. *low intensity* dimension paradigms. For example, according to (i), signs belonging to the French *taxeme* of prosodic topics [19] are distinguished according to the *dimensions* newness vs. givenness, and (ii) each joins other prosodic or verbal signs according to these respective semantic dimensions. We have also seen that imitative prosodic signs (e.g., word imitation through emphasis) can also be cumulated with a grammatical value belonging to one of these dimensions (e.g., the *high intensity* dimension for the insistence and intensification functions of emphasis).

Secondly, in our work [6], we organized (and exemplified) 30 types of *imitative meanings* in 10 domains of sound symbolism: *movement*, *strength*, *quantity*, *size*, *sonority*, *presence*, *resistance*, *spatial position*, *temporality* and *valence*. A significant proportion of these

imitative signs are also projections of *taxemes* (e.g., the strong vs. weak arousal taxeme) in different *domains* (e.g., *movement* and *strength* for these two signs, as a result of polysemy). These domains host either prosodic signs from different taxemes or isolated prosodic sign (not belonging to a minimal paradigm of definition). For example, in the *strength domain*, the imitation of *brutal strength* (loud and fast, projected from the arousal taxeme to this domain), is opposed to the imitation of *stable strength* (loud and slow, projected from the emphasis-attenuation taxeme), and to the imitation of *solemn strength* (low pitch, stemming from the Ohala/Gussenhoven *frequency code*).

4.2. Syntagmatic onomasiology: isotopy relations

Imitation can occur if the same meaning can be assigned to both the *imitated* verbal content and the *imitating* prosodic content. Firstly, the two signs (verbal and prosodic) are concomitant on the syntagmatic axis: the prosodic sign physically targets the verbal content, as suprasegmental features "over" the segmental pronunciation of the verbal content (i.e., another kind of *indexicality*). Secondly, not all of the meaning is identical: when an emphasis imitates the word *elephant* by positioning itself on the word (*I saw an ELEPHAAANT*), it is only certain semantic aspects of the word that are selected, i.e., its large size, and not the fact that it is an animal, with a trunk, etc. To account for this, certain identical meanings (*onomasiology*) are captured on both sides by an *isotopy* relationship (*syntagmatic* connection of two signs via the partial identity of their meanings [8]). Let's get into more technical detail. Firstly, interpretative semantics distinguish between *semantic features* that relate to membership in a paradigm (*taxemes, domains, dimensions*), and those that relate to a distinction between signs within the paradigm (*semantic distinctive features*). Secondly, the theory distinguishes between their *inherent* status (actualized in all contexts) or *contextual* status (needing to be triggered through an isotopic connection with another sign). For our subject, inherence is justified by the *motivational* facts set out in 2.: emphasis, for example, is recognized by its grounding in several resemblance iconicities, and in a biological indexicality. Its *distinctive +intense feature* is thus recognized in all contexts. On the other hand, the *domain* to which this intensity belongs (*size, sonority, strength, etc.*) depends on the context (and in most contexts, this emphatic core plays no imitative role, but only a grammatical one of insistence or intensification). To formalize this imitative interpretation, we therefore postulate a double isotopic relationship, at different levels in the sign's semantic structure, and with a different relationship to context.

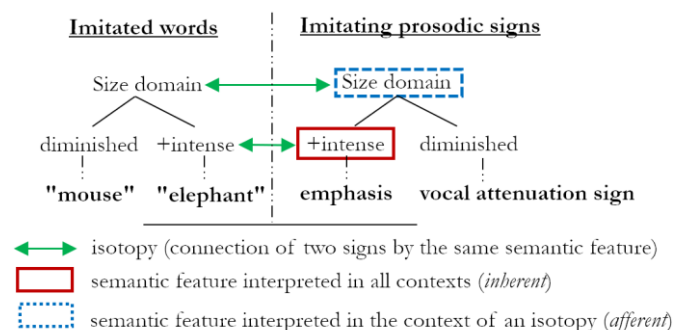


Figure 4: Imitation relation, coded by a double isotopy

This semantic analysis can be extended to the imitated verbal content: for a given word, to what extent are its *distinctive* semantic feature (such as +intense) and its *domain* feature (such as strength) recognized independently of their isotopic relations with the prosodic content that imitates this word?

5. Conclusion: limits of the proposed classification

Our modeling of imitative prosody, according to the stated conditions (categorization that crosses the entire prosodic field, disentanglement of motivational types, discourse activation by semantic chains) remains a work in progress. One of the first points of improvement envisioned is to open up to other semantic theories, and notably (presumably) cognitive semantics.

Another point of concern is the articulation of the theoretical and the empirical. Readers will surely have recognized our Saussurian heritage, which, by methodology, largely withdraws linguistic thinking from the realms of substance (phonetics). As *imitative signs* function in an impressive way (*image* production), different phonetic forms can achieve the same goal, with flexibility in the degrees of realization (depending on the *degree* of salience the speaker wishes to give to the image). For example, for emphasis, the enlargement effect of the sound print can work through a mixture of melodic excursion, loudness increase, and deceleration (syllabic lengthening). Not all vocal features are necessarily present, creating *allomorphs*. The difficulty is how to combine, for an assumed prosodic sign, both a phonic variation (allomorphy) and a semic variation (polysemic profiles). We shall therefore conclude with two types of remark, on allomorphy on the one hand, and on homophony on the other.

(i) The various possible vocalizations of an imitative sign (its allomorphs) must be studied empirically. A given imitative meaning (e.g., the imitation of a word expressing intense sonority) can be considered as one of the possible profiles of a polysemous imitative sign (in this case, emphasis), if it uses the same allomorphs as the sign's other profiles. If, on the other hand, the imitation of an intense sonority uses only the increase in loudness (and not the other allomorphs of emphasis), it would seem preferable to consider it as a *different sign* than the emphasis (albeit sharing an intense dimension). For example, the imitation of length (*looong*) in different domains (*time, space, size*) uses a syllabic lengthening and not an increase in loudness (*LONG): despite its intense dimension, we do not consider this meaning to be one of the profiles of emphasis (this sign does, nevertheless, amalgamate with grammatical insistence and intensification functions, cf. 3.2. However, this is an accumulation of different signs, not an accumulation of profiles of the same polysemous sign).

(ii) It has been shown that imitative profiles can be polysemous with non-imitative profiles (emphasis for *large size* vs. emphasis for *intensification*, for example). In addition, these imitative signs can also be *homophones* of other prosodic signs. In the case of the final lengthening allomorph of emphasis, for example, other signs also use this form: as a phonological feature of a major prosodic boundary [20], as a positive-lyrical prosodic sign (*a poeet*), or as a hesitation mark. However, as we have seen (cf. 3.2. syntagmatic semasiology), different meanings can *accumulate* in the interpretation of the same form. The use of the

notion of amalgam is in line with our aim of not separating the study of prosodic imitation from the rest of the prosodic field, and it is up to empirical studies of a *psycholinguistic* type to determine, for each context, to what extent certain functions are more *salient* than others in interpretation, when they are accumulated in the same form.

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