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A Dynamic Systems approach to language embeddedness. Insights from a cognitive-linguistic exploration of idiomatic constructions.

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Language as a complex, evolving system

- Mainstream linguistic theories consider language as a self-contained inner faculty made up of abstract symbols and formal rules hard-wired in the brain (Chomsky 1965, 1980, 1995; Pinker 1994, 1999);

- Nowadays, this view seems no longer tenable. An ever-increasing number of studies demonstrate that language is an amazingly <u>complex system</u>, characterized by <u>several different facets, dimensions, and time-scales</u> (e.g. Elman 1995, 2004; Rączaszek-Leonardi 2010; Van Orden et al. 2010; Cowley 2011; Wallot and Van Order 2011).

- Also, language emerges through <u>intersubjective experience</u> and evolves over time (e.g. Tomasello 2003; Cowley et al. 2004; Verhagen 2005; Zlatev 2008) in an ongoing process of <u>self-organization</u> (e.g. Rączaszek-Leonardi and Kelso 2008; Hodges and Fowler 2010; Fowler and Hodges 2011; Rączaszek-Leonardi 2013)

The present perspective

I will adopt an <u>empiricist</u> approach which exploits:

- notions from <u>Cognitive Linguistics</u> (e.g. Langacker 1987; Goldberg 1995; Croft 2001; Tomasello 2003; Croft and Cruse 2004; Evans and Green 2006) at a <u>descriptive level</u>;

- principles of <u>Dynamic Systems Theory</u> (e.g. Thelen and Smith 1994; Kelso 1995, 2008; Port and Van Gelder 1995; Ward 2002; Spivey 2007) at an <u>explanatory level</u>;

- the founding assumptions of <u>Ecological Psychology</u> (e.g. Reed 1997; Gibson and Pick 2000) as a <u>general background</u>.

The choice of Italian idioms as a case-study

- <u>A definition of idiom</u>: a complex symbol shaped by specific formal, semantic, pragmatic, cognitive, affective, socio-cultural, discoursive, and situational factors (cfr. Cameron and Deignan 2006; Langlotz 2006).

- <u>Idioms are interesting because</u>... the observation of their different patterns of stability and variation seems to represent a valuable window to the manifest complexities of the human mind as well as to the hidden ones.

- <u>Why Italian idioms</u>: as a native speaker, it is easier for me to have a deeper comprehension of the socio-pragmatic variables which affect the discourse context.

Langlotz's (2006) notions for the classification of idiomatic entry-forms

- <u>Compositionality</u>: the derivational predictability or regularity of the composite structure by adding up the values of its component parts.

- <u>Figurative-literal isomorphism</u>: the contribution of a component structure to the overall compositional value.

- <u>Motivation</u>: a speaker's ability to make sense of an idiomatic expression by reactivating or remotivating its figurativity, i.e. to understand why the idiom has the figurative meaning it has with a view to its literal meaning.

Four key cognitive-linguistic notions

- <u>Conceptual metaphor</u> (see Lakoff and Johnson 2003).

- <u>Conceptual metonymy</u> (see e.g. Barcelona 2000).

- <u>Conceptual blending</u> (Fauconnier and Turner 2002).

- <u>Construction</u>: any symbolic unit coupling form and meaning. Language is an ever-changing <u>network</u> of interrelated constructions of different levels of complexity, which is constantly updated and revised as a result of <u>usage events</u> (Croft 2001; Tomasello 2003; Goldberg 2006; Langacker 2008).

Dynamic Systems Theory

- A branch of mathematics which focuses on systems evolving over time. It has been applied to the study of phenomena in a wide range of sciences, including, in the last decades, cognitive science. For instance, it has shown remarkable results in the study of motion and motor control (e.g. Kelso 1984; Thelen 1995; Rosembaum 2005). Recently, it has also been taken into consideration in linguistics (e.g. Cameron and Larsen-Freeman 2007; De Bot et al. 2007; Gibbs and Colston 2012).

Dynamic Systems principles

- <u>Dynamic System</u>: a complex of aspects all evolving in a continuous, simultaneous, and mutually determining fashion.

- <u>State</u>: a set of variables that may change as a function of time.

- <u>Phase space</u>: the set of all possible values these variables can take.

- <u>Trajectory</u>: the sequence of states generated by the dynamics.

- <u>Flow</u>: the set of all possible trajectories.

- <u>Attractor</u>: a stable small set of the phase space toward which all nearby trajectories converge.

- <u>Basin of attraction</u>: a set of points converging to the attractor over time.

Dynamic Systems principles

- <u>Self-organization</u>: the process whereby coordination arises from the interaction of the components of the system.

- <u>Bifurcation point</u>: a point at which the trajectory undergoes a sudden change of direction, upsetting the stability of the attractor.

- <u>Catastrophe</u>: an abrupt change in the state of a continuous system.

- <u>Phase shift</u>: the transition of a system from an attractor to another.

- <u>Metastability</u>: the fluctuation between two or more mutually exclusive states over time.

A small sample of data

Observation of 70 to 100 real language occurrences of 17 idioms (drawn from the large web-based Italian corpus *ItTenTen*, investigated via the corpus-query system *Sketch Engine*) pertaining to three different patterns:

- 8 Idioms with <u>compositional, but experientially unrealistic meaning</u>. E.g. *Essere un allocco* ("to be a brown owl," i.e. to be stupid or naive).

- 6 Idioms with <u>literal compositionality and global motivation</u>. E.g. *Sentire un groppo alla gola* ("to feel a lump in one's throat," i.e. to be moved, touched).

- 3 Idioms with <u>literal compositionality, global motivation, and figurative-literal isomorphism</u>. E.g. *Perdere la bussola* ("to lose one's bearings", i.e. to get confused).

Conceptual nature and formal structure in a Dynamic Systems perspective

- *Spezzare il cuore (a qualcuno).*

  Break.inf the.msg heart.sg (to somebody).

  "to break somebody's heart," meaning to disappoint somebody deeply.

  Example of an idiom with a compositional but experientially unrealistic literal meaning.

An empirically detected attractor state

- <u>Definition</u>: the bundle of (both lexical and syntactic) constructions which are statistically (and, in some cases, analogically or ironically) associated with the keywords of an idiom, together with the particular semantic, pragmatic, affective, and socio-cultural values related to their co-occurrence. If the bundle includes several possible structures, these may differ in terms of the attractive force they have.

- The attractor emerges as a result of the constant, non-linear <u>interaction</u> of linguistic, cognitive, and socio-cultural factors in actual language usage events.

An empirically detected attractor state

FORMAL POLE	
Verbal form	Phrase order
Present IIIsg (21%) Past Participle (15%) Present (9%) Imperfect IIIsg (6%) Present Perfect (5%) Simple Past (5%)	NP(S) V NP(O) (23%) NP Vpasspart (15%) Aux V NP(O) (11%) V NP(S) (9%) NP(S) V (9%) NP(S) Aux V NP(O) (7%) V NP(O) (6%) NP(S) Aux V (5%)

An empirically detected attractor state

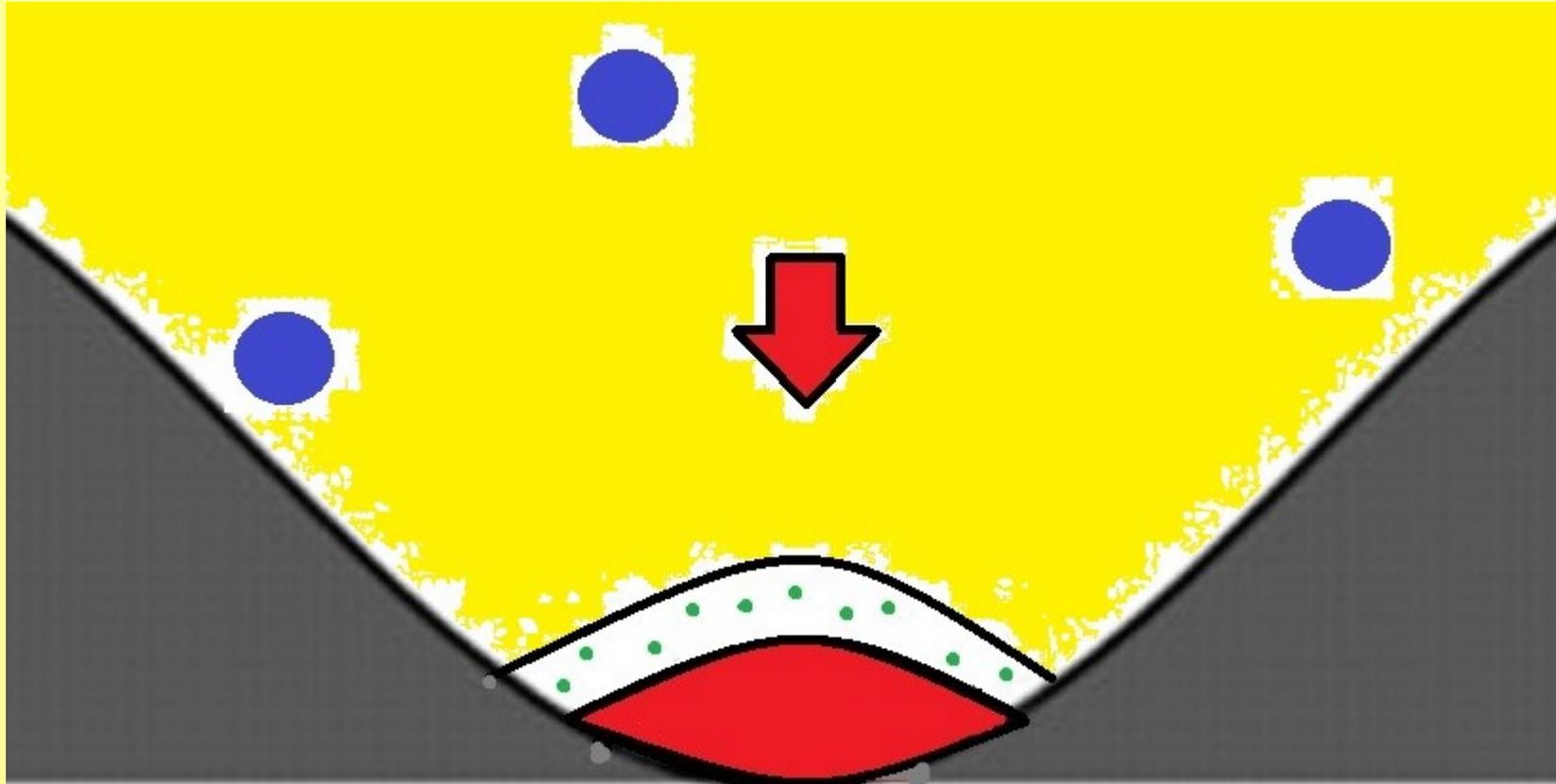| CONCEPTUAL POLE |
|---|
| Metaphor-Metonymy interaction |
| Conceptual metonymy: HEART FOR FEELINGS
Conceptual metaphor: DISAPPOINTMENT AS BREAKDOWN
Resulting in: DISAPPOINTING SOMEBODY AS BREAKING THEIR HEART |

Idiomatic constructions in Dynamic Systems terms

- The idiomatic expression = the <u>dynamic system</u>.

- Each particular usage event of the idiom = a <u>state</u>.

- The set of possible uses of the idiom = the <u>phase space</u>.

- The amount of all the observed instances of usage of an idiom = the <u>trajectory</u>.

- All possible evolutions of the form and meaning of an idiom = the <u>flow</u>.

- The combination of motivation patterns = <u>basin of attraction</u>.

Idiomatic constructions in Dynamic Systems terms

- The point at which a sudden change brings a newly emerged attractor to compete with the pre-existing attractor = <u>bifurcation point</u>.

- A loss of stability in the common properties of a relatively standard usage of an idiomatic expression = <u>metastability</u>.

- Such an abrupt change which causes the system to suddenly abandon the old attractor, directly converging to the new one = <u>catastrophe</u>.

- The drifting process of the standard usages of an idiomatic expression toward different common properties = <u>phase shift</u>.

Idiomatic constructions in Dynamic Systems terms

Red: attractor   Green: motivation patterns in the basin of attraction

White: basin of attraction   Blue: states (actual or potential usage events)

Soft-assembling idiomatic networks

- The dynamics outlined above cause the emergence of <u>flexible networks of idiomatic constructions</u>, linked to each other via formal and/or conceptual features.

- Each idiom represents a dynamic system, governed by a principle of <u>causal circularity</u>: while the use of the idiom is constrained by the attractor and the basin of attraction, it also shows a trajectory, which is constantly shaped by the bulk of interactions between formal, semantic/pragmatic, cognitive, socio-cultural, and contextual factors, in a self-organizing fashion.

Soft-assembling idiomatic networks

- From a cognitive-linguistic perspective, the bulk of these idiom-networks represents a portion of the larger <u>network of constructions</u> which makes up the whole linguistic system. Therefore, the structure of the network can be seen as a micro-scale example of the global architecture of the whole system.

- *Spezzare il cuore (a qualcuno).*

  Break.inf the.msg heart.sg (to somebody).

  "to break somebody's heart," i.e. to disappoint somebody deeply.

Soft-assembling idiomatic networks

- *Colpire   al   cuore   (qualcuno).*

  hit:inf.   To-the.msg   heart.sg   (somebody.m).

  "to hit somebody's heart", i.e.:

  1. to damage a system's nevralgic center.

  2. to disappoint somebody deeply.

- *Avere   una   spina   nel   cuore.*

  Have:inf   a.f   thorn.sg   in-the.msg   heart.sg

  "to have a thorn in one's heart", i.e. to have a source of worrying.

Soft-assembling idiomatic networks

- *Sentirsi   piangere   il   cuore.*

  Feel:inf.refl   cry:inf   the.msg   heart.sg

  "to feel one's heart cry", i.e. to be very sorry.

- *Sentirsi   stringere   il   cuore.*

  Feel:inf.refl   shrink:inf   the.msg   heart.sg

  "to feel one's heart shrink", i.e. to be moved.

Soft-assembling idiomatic networks

- *Allargare   il   cuore.*

  Enlarge:inf   the.msg   heart.sg

  "to enlarge somebody's heart", i.e. to console them.

- *Scaldare   il   cuore.*

  Warm:inf   the.msg   heart.sg

  "to warm somebody's heart", i.e. to console them.

Soft-assembling idiomatic networks

- *Avere   un   cuore   d'   oro.*

  have:inf.   a.m   heart.sg   of   gold

  "to have a golden heart", i.e. to be very kind and generous.

- *Avere   un   cuore   grande   come una   casa.*

  Have   a.m   heart.sg   big.sg   like   a.f   house

  "to have as big a heart as a house", i.e. to be very kind and generous

Conclusion:
the embeddedness of language

- The observations made above with reference to the <u>usage-driven</u> nature of idiomatic constructions and the emergence and changing of self-organizing idiom-networks seem to provide support for a <u>dynamic</u>, <u>ecological</u> characterization of the linguistic system.

- Language is not an innate, hard-wired, encapsulated faculty. It is an <u>emergent cognitive function</u> which is shaped by the constant interaction with other cognitive functions and an individual's everyday experience in the (physical as well as socio-cultural) environment.

Conclusion:
the embeddedness of language

- Both synchronically and diachronically, ontogenetically and phylogenetically, the emergence, structure, and evolution of the linguistic system can only be explained if the multiplicity of <u>context-bound interactions</u> between intentional agents (systems of coupled brains and bodies) and environment are taken into consideration.

- In a word, language is <u>embedded</u> in a larger system, standing in a relationship of <u>mutual influence</u> with the other components of this system, and should be investigated as such. Any attempt to characterize language as an innate self-contained system looks arbitrary and artificial.

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THANK YOU!

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