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HAL Authorization

BBS Commentary Proposal

1. Name of the target article

“Expression unleashed: The evolutionary & cognitive foundations of human communication”
by Christophe Heintz & Thom Scott-Philipps

2. Word counts

Abstract: 60 words

Main Text: 999 words

References: 437 words

Entire text (Total + addresses, etc.): 1851 words

3. Commentary title

What semantic dementia tells us about the ability to infer others’ communicative intentions

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32 **10. 60-word abstract**

33 As Heintz and Scott-Phillips rightly argued, pragmatics has been too commonly considered as
34 a supplement to linguistic communication. Their aim to reorient the study of cognitive
35 pragmatics as the foundation of many distinctive features of human behavior finds echo in the
36 neuropsychological literature on tool use, in which the investigation of semantic dementia
37 challenges the classical semantics *versus* pragmatics dissociation.

38

39 **11. 1000-word main text**

40 Heintz and Scott-Phillips stressed that humans possess cognitive means of adaptive
41 reaction targeted at the behavior of conspecifics: Humans cannot un-understand what others
42 say. The neuropsychological literature on tool use in semantic dementia corroborates and
43 extends this perspective in indicating that humans cannot un-understand what others “expect”.
44 This literature provides insights into the neurocognitive bases of the ability to infer others’
45 communicative intentions, which can contribute to make human evolutionary sciences less
46 “neurocognition” blind.

47 Tool-use disorders – also called apraxia of tool use (Osiurak & Rossetti, 2017) – are
48 traditionally assessed by asking patients to show how to use familiar tools presented in
49 isolation (i.e., single tool-use/pantomime tasks; **Table 1**). These tasks are considered to
50 investigate semantic knowledge about tool function (Goldenberg & Hagmann, 1998). Others
51 suggest that these tasks engage sensorimotor knowledge about tool manipulation (e.g., Rothi,
52 Ochipa, & Heilman, 1991), but we limit our discussion to the semantic dimension. The
53 rationale is that the mere presence of a tool should be enough to activate the corresponding
54 semantic knowledge and, thus, help the patient use the tool appropriately. Although these
55 tasks appear simple at first glance, individuals, including healthy ones, frequently hesitate
56 about the actions to perform and ask the clinician for more information about what is
57 expected. Indeed, the absence of associated objects makes the task ambiguous and obliges the
58 individual to infer the clinician’s expectations or communicative intentions in Heintz and
59 Scott-Phillips’ terms. After all, if you frequently use newspapers to light fire, what would you
60 do if a clinician asked you to show how to use them? Would you pretend to light fire with
61 them or read them? To find the correct answer, you must infer that the clinician may expect
62 that the demonstration involves the most frequent usage of newspapers. So, you would have
63 to pretend to read them, otherwise your demonstration could be considered as pathological.

64 These tasks are much more than simple tool knowledge tasks and illustrate how semantic
65 knowledge and cognitive pragmatics are intertwined. The study of semantic dementia is
66 particularly enlightening on this point.

67 Semantic dementia is a variant of frontotemporal dementia, which is characterized by an
68 inaugural atrophy of the polar temporal lobes that are known to play a critical role in semantic
69 cognition (Lambon Ralph, Jefferies, Patterson, & Rogers, 2017). At the onset of the disease,
70 patients lose knowledge about unfamiliar things. Thus, they can name a giraffe as a dog with
71 a long neck. Then, even knowledge about familiar things is lost. Patients can name a dog or
72 any four-legged animal as “Ruben”, their dog. Their interpretation of their environment
73 becomes progressively guided by their episodic memory, which generates communicative
74 disorders. They become egocentric (Snowden et al., 2001; see also Moreaud et al., 2008) and
75 this egocentrism becomes also visible in single tool-use/pantomime tasks. For example, if a
76 patient with semantic dementia is asked to demonstrate how to use a colander, the patient can
77 be unable to name it or give details about its function, but can say it is useful for changing the
78 oil of a car. This response can be explained by the observation that the patient has been
79 occupied with car repair for the past several weeks. This idiosyncratic and egocentric type of
80 reference is very common in in semantic dementia.

81 One may consider that the difficulties reported in semantic dementia in single tool-
82 use/pantomime tasks reflects nothing else than the selective loss of knowledge about tool
83 function, which prevents the patients from using familiar tools appropriately. If so, then
84 semantic dementia should be characterized by a general tool-use disorder that also impacts the
85 real use of tools presented with objects (i.e., real or novel tool use; **Table 1**) as in some
86 patients with left brain damage (for review, Osiurak & Reynaud, 2020). However, evidence
87 indicates that semantic memory is neither necessary nor sufficient for real tool use (Baumard
88 et al., 2019; Buxbaum, Schwartz, & Carew, 1997). This is also true for patients with semantic

89 dementia, who obtain quasi-normal performance in real tool-use tasks (Baumard et al. 2016)
90 or when they use familiar tools in their everyday life (Bozeat, Lambon Ralph, Patterson, &
91 Hodges, 2002a; Lauro-Grotto, Piccini, & Shallice, 1997). These patients have also “normal”
92 performance on novel tool-use tasks (Hodges, Bozeat, Lambon Ralph, Patterson, & Spatt,
93 2000; Lesourd et al., 2016; **Table 1**), which suggests that their technical-reasoning skills are
94 spared, allowing them to reason appropriately about mechanical actions that involve tools and
95 objects. In fact, their good technical-reasoning skills explain why they can use familiar tools
96 with their corresponding objects (i.e., real tool-use tasks) even if they cannot name or give
97 details about them. The presence of both tools and objects makes the task “more mechanical-
98 oriented”, leading them to reason about the mechanical actions that they can generate from
99 their presence, as in novel tool-use tasks. In this case, the clinician’s expectations have not to
100 be included in the equation. By contrast, patients with semantic dementia meet difficulties in
101 single tool-use/pantomime tasks that are strongly linked to the severity of semantic deficits
102 (Bozeat, Lambon Ralph, Patterson, & Hodges, 2002b; for review, see Osiurak et al., 2021). In
103 sum, these patients have no tool-use disorders strictly speaking. Instead, it is the artificial
104 nature of the single tool-use/pantomime tasks that obliges the individual to include the
105 clinician’s expectations in the equation and that makes the task difficult for a patient with a
106 loss of semantic knowledge.

107 These findings, which challenge the classical semantics *versus* pragmatics distinction,
108 are in line with Heintz and Scott-Phillips’ perspective by suggesting that there is no reason to
109 see cognitive pragmatics as peripheral to linguistic communication. Semantic dementia tells
110 us that semantic memory supports the ability to infer others’ communicative intentions, which
111 complements their perspective by building a bridge with the neurocognition domain.
112 Semantic dementia is characterized by lesions to the polar temporal lobes, which are known –
113 as also illustrated here – as playing a key role in semantic cognition. Evidence also indicates

114 that these brain regions are part of the mentalizing network (Gallagher & Frith, 2003), thereby
115 drawing an interesting link between semantic cognition and the ability to understand others'
116 intentions.

117 **12. Conflict of interest statement**

118 None.

119 **13. Funding statement**

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122 **14. Alphabetical reference list (APA Standard)**

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- 160

Table 1. Neuropsychological tool-use tasks

Task	Description
Pantomime of tool use	The individual demonstrates the use of a tool* presented in isolation without holding it in hand.
Single tool use	The individual grasps a tool presented in isolation and shows how to use it.
Real tool use	The individual actually uses a familiar tool with a familiar object (e.g., pounding a nail with a hammer).
Novel tool use	The task can consist in using familiar tools in a non-conventional way (e.g., driving a screw with a knife) or in selecting, making and/or using novel tools to solve mechanical problems (e.g., extracting a target out from a box by folding a wire to create a hook).

* The term tool will be hereafter used for the implement that performs an action (e.g., hammer) and the term object for the recipient of the action (e.g., nail).