

# Missing and Declining Affordances: Are these Appropriate Concepts?

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**Abstract** *The concept of affordance has been brought to HCI by Don Norman, who has recently protested against its misuse by designers. They say they will put affordances in the interface, or afford this or that to the users, but Norman points out that affordances only exist inasmuch as they are perceived by users. Therefore, it doesn't make sense to use the term as designers do. This paper takes the designers' phrases as a spontaneous expression of design intent and explores the correspondences between these and two of the phenomena captured by communicability evaluation: missing and declining affordances. It highlights some useful distinctions between levels of affordances, and hints at possible links between communicative and cognitive perspectives. It suggests that framing affordances within a broader communicative dimension, and taking advantage of the rhetoric that people use to describe what they are doing, can bring interesting insights to design.*

**Keywords:** *affordances, communicability evaluation, semiotic engineering*

## 1 Introduction

The concept of *affordance* [6] gained popularity in the HCI community with Don Norman's books on the objects of the world whose design "*communicates possibilities that are inadequate, or are downright misleading*" ([3] p.248). In a recent article, Norman protested against the widespread misuse of his ideas, saying that he "*was really talking about perceived affordances, which are not the same as real ones*" ([9] p.39). In his view, affordances in general define the range of possible activities, but in HCI they are of little use if users cannot perceive them. In this context, speaking about *putting affordances here and there* in the interface is entirely wrong, he argues, because the status of affordance is something only users can grant to interface components. Designers can only hope that users will do it.

Although we will never dispute with the author what

he meant to say, we wish to bring another perspective into the debate, based on our own work on semiotic engineering [2] and communicability evaluation [10, 11]. Because the use of language plays such an important role in Norman's protest, it is worth noting that some of the listed meanings of the verb *to afford* in popular dictionaries of the English language are *to give*, *to furnish*, and *to provide* [7, 13]. So, what designers may be expressing by saying they will *afford this and that*, is their expectation that users will perceive what they meant to afford (*give* or *provide*) through computer systems interfaces.

Perception is related to interpretation, and perceived affordances involve intensive sense making. The idea that the appearance of a device provides critical clues required for its proper operation [8, 9] corresponds to the notion of *signification* in Semiotics [5], which is at the heart of sense making. The appearance *signifies* some-

thing to users, to the extent that they assign meaning(s) to it. Moreover, *communication* is a process whereby the possibilities of signification are explored for practical purposes ([5] p.4). Thus, when what users perceive as affordances is what designers meant to communicate as interactive possibilities, we can reinstate the designers' perspective of *affording* things.

Having set the context of our paper, we will discuss two of the phenomena captured by the communicability evaluation method [10, 11]: missing and declining affordances present in interactive systems interfaces. Our goal is to show how understanding and checking for these phenomena may be beneficial to designers in different scenarios. The basis for our argument is a set of empirical studies we have carried out with users of an HTML tag editor – SpiderPad© [12]. Although the studies did not (and were not meant to) have statistical significance, they demonstrated the range of new insights we can gain by complementing a psychological perspective on interactive affordances with a communicative one.

We will briefly explain and illustrate what we mean by the terms *missing* and *declining* affordances. Then, we will discriminate among different levels of affordances and relate them to communicative phenomena that have been observed in our studies. After that, we will hypothesize three different design scenarios: one in which the user's perception is in tune with the designer's expectations; another in which this is partially the case, but some unexpected and/or undesired deviations are observed; and yet another in which users fail to perceive the designers' intent, or prefer affordances that designers did not mean to be preferential in a given context.

All examples will be given in the context of real use situations, and the conclusions of the paper will show that embracing the fact that designers think of themselves as affording interactive opportunities to users can be beneficial in a number of cases. In particular, it can give us indications for the possibility of integrating communication and cognition as related phenomena.

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## 2 On missing and Declining Affordances

Communicability evaluation is a method based on

semiotic engineering that aims at assessing how designers communicate to users their design intents and chosen interactive principles. In our semiotic perspective, user interfaces are one-shot higher-order messages sent from designers to users. By evaluating the communicability of interactive software they produce, designers can appreciate how well users are getting the intended messages across the interface and identify communicative breakdowns that may take place during interaction. This information allows them to spot persistent communication problems with the interface, as well as unexpected usage and rejection of interactive possibilities they meant to provide to users.

In communicability evaluation, evaluators define a set of tasks for users to perform and record their interaction using software that is able to capture mouse-pointer movements and other screen events (e.g., Lotus® ScreenCam™). The evaluation method itself comprises three steps (for a detailed description see [10],[11]):

### Tagging

A small set of utterances that users are likely to produce as they interact with software, such as “*What's this?*”, “*Oops!*”, “*Why doesn't it?*” or “*I can't do it.*” are tagged (i.e. associated to) portions of recorded interaction (users waiting for tooltips, stepping back to the previous state of the system, insisting on an interactive step that is clearly not working, or consciously abandoning the task without achieving the goal, respectively). This step may be carried out by experts in semiotic engineering, designers, or users themselves. When carried out by users, tagging leads to a kind of *a posteriori* controlled verbal protocol analysis. When done by designers or experts, tagging is equivalent to *putting words in the user's mouth*.

### Interpretation

In the interpretation step, the evaluator tabulates the data collected during tagging and maps the utterances (communicability tags) onto HCI ontologies of problems or design guidelines. Alternative ontologies may be used in this step. The generic classes of problems identified by our method are related to navigation, meaning assignment, task accomplishment, and missing and declining affordances. This step can be carried out by experts or by designers with ready-made mappings of utterances onto ontologies.

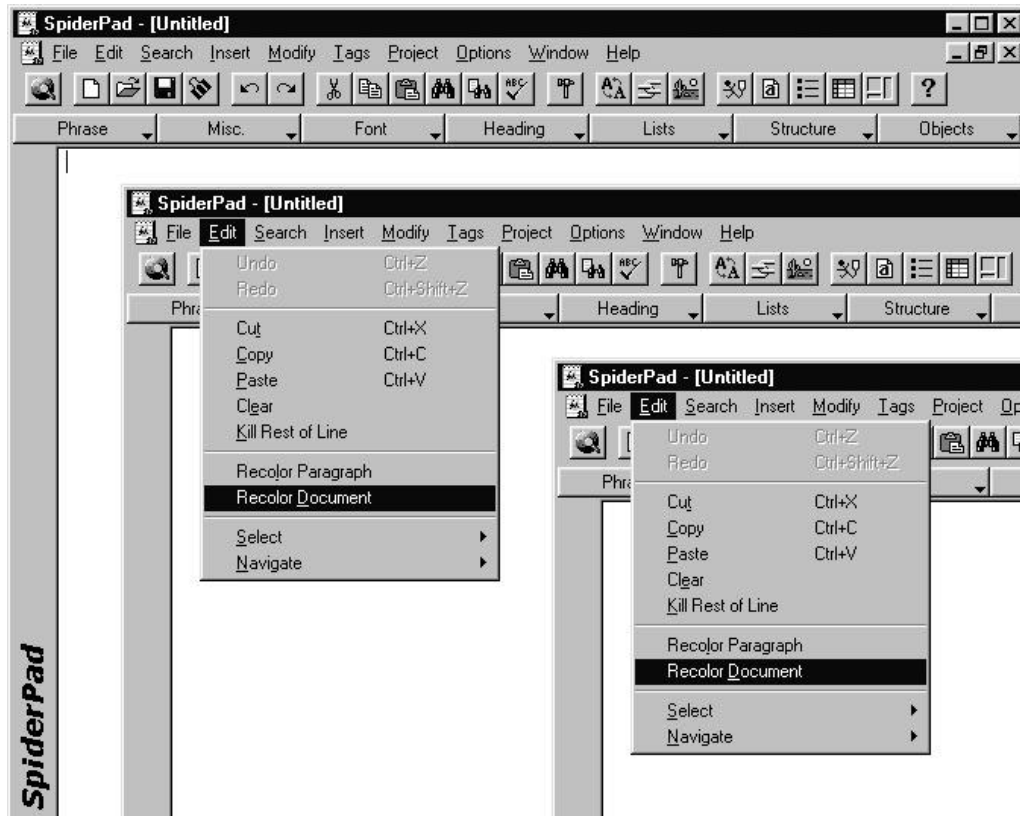


Figure 1 - An example of the “Why doesn’t it?” tagging context

## Semiotic Profiling

In the semiotic profiling step, the evaluators proceed to interpret the tabulation in semiotic terms, in an attempt to retrieve the original designer’s meta-communication, that is, the meaning of the overall designer-to-user message. This step should be performed by a semiotic engineering expert, due to the nature of the analysis.

An example of a “Why doesn’t it?” tagging context is shown in Figure 1. It actually occurred in one of our test situations, where users were asked to change the background color of an HTML page they were editing with SpiderPad. A number of participants expected that the option RECOLOR DOCUMENT in the EDIT menu would refer to the colors that appear in the HTML document. They did not know that it actually refers to the colors of the HTML tags on the editor’s page (blue, for instance, opposed to the color black used for text that is outside the tag brackets). What we see in Figure 1 is an assembly of three successive screen shots. The outermost one shows the menu, toolbars and canvas the

user could interact with. The two others show two sequential and identical interactive attempts of the user at changing the background color of the page he was about to create. The system apparently responds by doing nothing (since there are no tags to be recolored on the page). One of the participants repeated this very same attempt three times in a row, as though he did not believe his choice was wrong. The utterance we tag to this repetitive pattern of interaction is then “Why doesn’t it <do what I think it should>?”.

Cases of missing and declining affordances are actually the most significant difference between communicability evaluation and other usability evaluation methods (for a comprehensive survey, see [4]). Missing an affordance is equivalent to not perceiving it, and resolving the problem path by other means. In Norman’s terms the affordance doesn’t exist. However, the designer meant the *affordance*, although communication has not been achieved through the media or code he decided to adopt. The utterance used for this situation is “I can do otherwise.” The pattern for it is that the interface

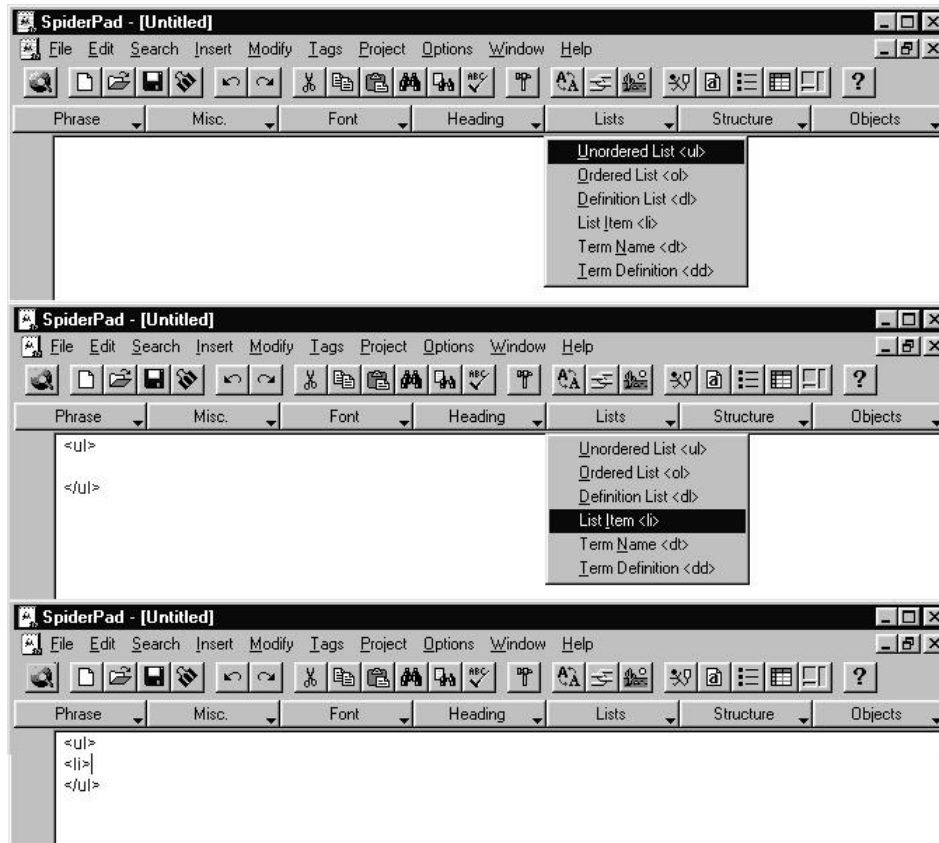


Figure 2 - Affordances of items on the TAG BAR

affords (to experts, designers, or other users) a way to achieve a certain effect. But the user whose current goal is to achieve exactly this effect does not realize the affordance (i.e. misses it), and finds another way (often more laborious) to do it. For example, we see in Figure 1 that SpiderPad’s toolbar contains a tool for constructing tables rapidly (third button, right-to-left, with a table grid icon). However, when given the task of constructing a table, another participant in our case studies decided to use the TAGS menu to create the whole structure of table rows and columns, step by step. This was a much longer path, of course, and the participant never realized there was an easier way to achieve the goal.

Declining an afforded pattern of interaction, tagged by the expression “*Thanks, but no, thanks.*”, emerges from a different situation. Now the user is aware of the affordance, but decides not to make use of it. We can tell the user knows that the affordance is there because the recorded movie of his or her interaction with the system shows one or more instances in which the affordance was put to use. However, later, when the same goal is to be achieved, the user chooses another pattern of interaction, which becomes his or her preferential

choice. An instance of it was observed when a number of participants, having used the pulldown menus afforded by what we call the TAG BAR (the secondary menu/toolbar beneath the toolbar, with buttons named Phrase, Misc., Font, Heading, etc.), abandoned this possibility in favor of typing directly the tags, using the keyboard. In Figure 2, we see the options on the TAG BAR.

The participant, in the context of our test, had to create an unordered list of items. By clicking on the option **LISTS** on the TAG BAR, he found he had the option **Unordered List <ul>**, which he immediately chose. The result was opening and closing the <ul> HTML tag on the canvas. The next step was to click on the option **List Item <li>**, which caused one <li> tag to appear on the canvas. However, the list the user had to create had many items and the user *declined* the affordance of the TAG BAR<sup>1</sup>. For the subsequent items on the list, he

<sup>1</sup> Figures 1 and 2 show a slightly different configuration of SpiderPad than that actually used in the actual tests carried out for our studies. The list wizard on the toolbar (fourth button from right to left) was not available to the participants, who used the default configuration pro-

typed in the tag.

The relevant aspects of our studies, regarding missing and declining affordances were that:

If taggings like “*I can do otherwise*” and “*Thanks, but no, thanks.*” are systematically observed with different users in the same situation, they can tell designers that maybe the communication choices made to carry their message across to the users were not adequate and/or that their assumptions about the users’ profiles were wrong. Although alternative interactive paths may be present in the interface to introduce beneficial redundancy in HCI, still these taggings can indicate if the choices for expressing redundancy were good enough. Successive evaluations of redesigned interaction may fine-tune communication to a good match between designers intent and users perceptions ([10]).

Over a period of time, the frequency of “*Thanks, but no, thanks.*” utterances tends to increase, as users develop their own style of interaction with the application ([11]). This specialization corresponds to the linguistic notion of *idiolect*, the dialect of an individual, the personal way in which he systematically makes use of language when expressing himself. An interesting opportunity for designers is to examine cases where users are declining affordances and to decide whether their preferred patterns point at a more efficient way of performing the task, a local interactive obstacle along a wider path of interaction (which is declined as a tactic or strategy for problem-solving), or merely poor design choices.

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### 3 Levels of Affordances

When speaking of affordances we should differentiate between levels of affordances. With the exception of affordances that are designed to be an intentional redundant component in design, users miss or decline affordances such as pushing certain buttons or moving objects on a canvas, as well as they miss or decline entire problem-solving methods anticipated and offered by designers. Thus, we classify affordances into operational, tactical, and strategic affordances.

Operational affordances are those relative to individual actions users perform, such as we saw in the example where a SpiderPad user declined the use of the TAG BAR to insert the <li> HTML tag in his document. Tactical affordances are relative to a path of actions that can

be carried out to achieve goals and sub-goals. An example of users declining tactical affordances was noticed in our studies when participants chose to use the table wizard, in SpiderPad's toolbar (see Figure 1), only to create the HTML structure for the table. They declined facilities embedded in the wizard such as defining attributes or filling in table cells. Finally, strategic affordances are those relative to the conceptualizations involved in problem formulation and problem solving processes. For instance, some of the participants in our studies definitely preferred an alternative HTML editor to SpiderPad. Independently of perceiving, missing, or declining operational and tactical affordances, they said they would rather use a WYSIWYG editor, in which editing web pages is nearly the same as editing any other page.

The most interesting benefit of separating affordances into such classes, however, seems to be the possibility to investigate whether some affordances are declined at one level because related affordances are missed at another. This has been verified in some situations that occurred during tests with participants and in our own use of SpiderPad as a tool. The following two examples briefly describe the kind of higher-order tagging we would get.

*Thanks, but no, thanks. I don't want to create a template file for my HTML pages*

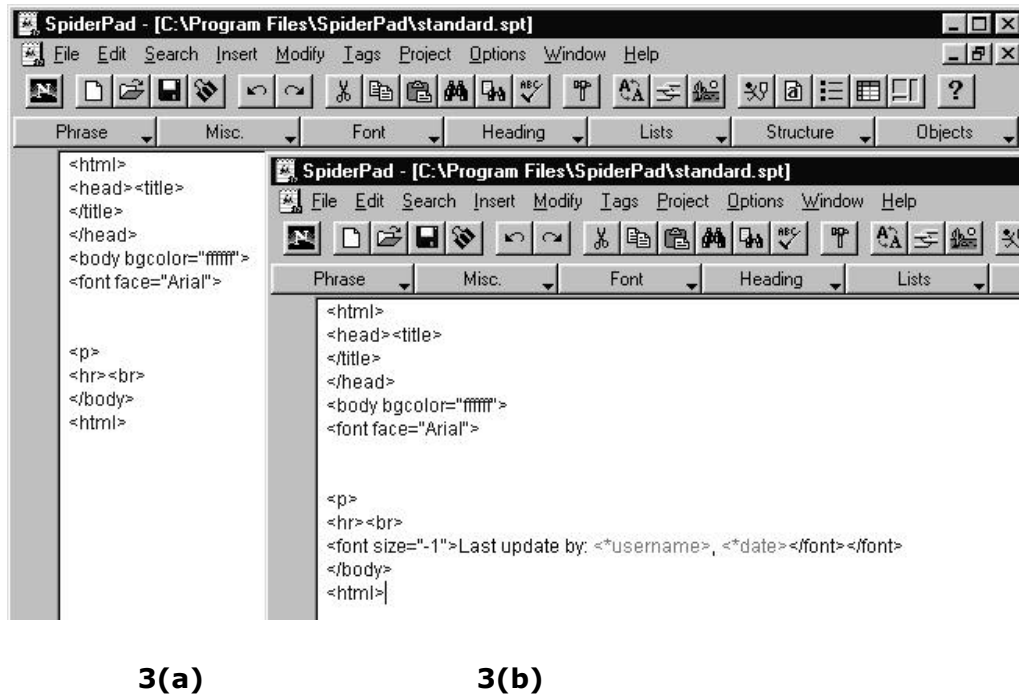
This is a case of declining an operational affordance (SAVE AS SPT) because the user misses the tactical one. He interpreted template files in SpiderPad as a normal HTML file with text that is repeated in most pages. For instance, he thought that a typical template for his pages would be what is seen in Figure 3(a). He missed the affordance that variable tags can be used in such templates to insert values that vary over time (typically date, hour, day of the week, etc), as shown in Figure 3(b). Thus, the cost/benefit to him did not seem attractive and he declined the offer. However, when he found out that variable tags could be used in templates, the whole notion of standardizing pages in a site came to mind, and suddenly the cost/benefit situation became much more attractive.

*Thanks, but no, thanks. I'd rather not use SpiderPad.*

This was the case of a user who frequently includes HTML list structures in his pages. As we said above, the original setting for SpiderPad does not afford a toolbar button to access the list wizard. Because the alternative HTML tag editor used for comparisons in our studies afforded this, the user said he preferred this other editor to SpiderPad.

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vided by the developers. But this does not affect the point of our illustration.



**Figure 3** - (a) Template containing only constant tags;  
(b) Template containing constant and variable tags

However, if he had realized that he could have configured SpiderPad’s toolbar and inserted the list wizard button (see toolbar in Figure 2), he might have changed his mind and found SpiderPad to be more usable. That is, because he missed the configuration affordance (at operational and tactical level), he declined solving HTML editing problems with SpiderPad (at the strategic level).

The possibility of distinguishing between these different levels of affordances (perceived, missed, or declined) is a valuable contribution of communicability evaluation, since it explores a new perspective of HCI design. But designers, who can ultimately provide the appropriate context, must endorse the relevance of such exploration.

## 4 Benefits of the Approach in Different Design Scenarios

Communicability evaluation is based upon the interpretation of signs. As part of a semiotically-based approach to HCI [2], it explicitly addresses the fact that meaning is in the mind of the beholder but also emphasizes the ways by which interpretations may be motivated by form and context. This section will show how an evaluation of messages users may be getting from

designers can be beneficial to improve the designer-to-user communication and, consequently, increase the chances of affordances being perceived.

We will present three different situations that come out of communicability evaluation with respect to missing and declining affordances. The first is one in which designers take the evaluation results as good news; the second is one in which the results are partly good news, and partly bad news; and finally the last one is that in which the designer definitely doesn’t like the news.

### ☺ Good news

- Very few, if any, cases of missing affordances
- The designer has evidence that his message is getting across to users.
- Very few, if any, cases of declining affordances
- The designer sees that users’ perceptions are those he expected to be.

However:

The designer should be aware of two potential problems hiding underneath the appearances. One is that his observations are made at the very early stages of the users learning curve, when interaction can be expected to be *conservative* (as opposed to *creative*). The other is that the range of affordances is too narrow, and that

users cannot do anything differently (even if they wished to). This latter situation shouldn't be taken to mean that the users are necessarily happy with the interactive affordances. The role of interviews and complementary tests is very important here, because evaluators can explicitly ask users about their degree of satisfaction with the application.

### ☹ Good News, and Bad News

- Some cases of missing affordances

Communicability evaluation will show that some users are missing a certain set of affordances. This is bad news if the designers did not expect this to happen. In this case, evaluation results may indicate to the designer that there is an opportunity for organizing distinct interactive patterns for different user profiles.

However:

If the designer has intentionally differentiated communication styles for distinct user profiles, then maybe the users who are missing affordances are precisely those who the affordances have not been designed for. So, in fact, this is good news for the designer.

- Some cases of declining affordances

In a way, the news about cases of declining affordances is the same as those about missing affordances. That is, it could indicate to the designer that more fine-grained distinctions between user profiles could be made. We should point out that the situation might be less critical when users decline affordances (at the operational level) than when they miss them.

However:

Designers should be aware of the fact that users may be declining operational affordances because they are actually missing tactical or strategic affordances (as discussed above).

### ☹ Bad News

- Some or many cases of missing affordances

If there are many cases of missing affordances, the designer is not getting his message across to users, and the application is being poorly used because users don't realize what is there. This is directly related to poor usability scores. An outcome of this evaluation could be to convey the missed affordances in a different packaging, possibly as a result of complementary interviews and other usability evaluation experiments. But even if there are only some cases, this may be bad news if these are exactly the affordances the designer sees as the most important features in his product.

- Some or many cases of declining affordances

The users don't see the advantages of affordances they perceive, and choose secondary patterns of interaction, when compared to the ones the designers expected. The benefit of communicability evaluation in this case is that it gives the designer a clue to the actual users' preferences. As in the case of missing affordances, a smaller number of declining affordances may be bad news if the declined features are precisely the most valuable in the designer's view.

On the other hand, some cases of declining affordances could actually be an indication of users' creative thinking in action. Although designers may initially predict that affordances will be used in one way or another, users learn and adapt applications to evolving contexts. They may, for example, use text editors as a tool to create and exhibit overhead slides. Thus declining may actually point at adapting, and be good news for designers [1]. In this case, users are actually extending the usability spectrum of the application.

The intensive interpretive processes involved in communicability evaluation suggest that different qualitative payoffs may be reached depending on who does the tagging and who does the subsequent steps of evaluation. The ideal situation would be to have users and one or more experts do the tagging, and designers and one or more experts do the subsequent steps. This would compensate for biases introduced by each party in the process.

The advantage of having users and experts do the taggings is that users will identify genuine cases of communication breakdowns, but they might not be able to capture higher-order meanings embedded in the application (such as tactical affordances, for example). They might also misinterpret the state of the system in terms of the task to be achieved. The identification of such cases is clearly within the reach of an expert who has defined the task and observes the users' performance.

When it comes to interpreting the tabulation of taggings and producing semiotic profiles, designers certainly are expected to be able to identify immediately whether their message got through to users or not. However, semiotic engineering experts are trained to explore patterns of signification in HCI, and are better equipped to generate alternatives for communication if redesign is required. Their interaction with designers is likely to produce a wealth of explanations and predictions about how affordances may be perceived by users.

A discount situation may be reached if only user taggings are made and the designers themselves interpret tests results, using a predefined mapping of utterances

onto ontologies of HCI problems or design guidelines. The most crucial problems will certainly be identified, but the more subtle ones may not and, what may be a problem, explanations of the observed phenomena and predictions about communicative strategies may fail to be correct.

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## 5 Conclusion

This paper has presented possibilities of exploring the fact that designers spontaneously see themselves as *affording* interactions to users. Whether their statements are metaphors for other notions or not, we have shown that combining them with communicability evaluation results relative to missing and declining affordances may produce valuable insights into design.

One of these insights is the distinction between different levels of affordances. Up to now, communicability research had only dealt with operational affordances. The gain for designers at this level is to have a sense of how efficient and effective are their choices of interactive codes in which to convey affordances. But here we have gone one step beyond operational affordances and discussed the potential gains of investigating missing and declining affordances at the tactical and strategic levels. As far as tactics are concerned, designers can be alerted about the users' missing or declining sequences of interactive steps, which actually constitute methods for achieving tasks or subtasks. This is a threat to the usability of the application inasmuch as users may not be able to achieve their local goals efficiently. From a developer's point of view, this may also be very bad news since resources allocated to implement these methods may have been wasted in the process.

The situation with strategic affordances is even more crucial. The designers' attention can be called to the fact that users may be either not perceiving or misinterpreting the value of the *technology* embedded in the application. This problem may lead to some undesirable commercial consequences, in that potential clients could choose a competitor's application. The preferred application might even provide less technological benefits than the one being rejected, but because *communicability* is better in the preferred one, it is perceived as a better *technology*. In our case studies, we have gathered some evidence that this might have been the case.

The relevant point at both the tactical and the strategic level is that users may be missing and declining affordances because they actually cannot make sense of operational affordances. Thus, the person who is interpreting taggings and conducting the final evaluation

should be careful to identify cases where missing and declining operational affordances might have relevant implications at the tactical and strategic levels, and could, thus, seriously affect the usability of the application.

Dealing with a wider scope of affordances may enable us to treat interactive phenomena in an integrated context of communication and cognition. In section 3, we showed cases in which unexpected task-related tactics and strategies followed by users may have been caused by poor designer-to-user communication choices.

Last but not least, the fact that along the learning curve users may develop different idiolects to interact with the application points at the benefits of designing configurable and/or extensible applications. In these cases, users will be able to adapt the style of communication to fit their *current* preferences and needs. At the operational level, users may rearrange signs afforded by the designers, so that they emphasize the affordance of the ones that are most meaningful to them. At the tactical level, users may create customized methods of their own in order to meet their needs. And the ability to do both types of adaptations is expected to have a positive impact at the strategic level, increasing the usability of the application.

The conclusions we have reached suggest that a promising avenue for research is that of investigating the rhetoric of HCI, from a combined designer-and-user perspective, with the support of communicability evaluation. The goal of such research would be to enable designers to view interactive affordances as the result of conscious technical choices of communication, at the operational, tactical and strategic levels, and to contrast their achievements with a cognitive approach to *affordances* as they are perceived by users.

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