Alterations of Relevance in Cyber-media[*]

Alteraciones de la relevancia en los ciber-medios

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ABSTRACT

The way people interact with other people and access information has changed drastically with the popularisation of "information and communication technologies" (ICT). However, in *relevance theory* Sperber and Wilson (1986) insist that our cognitive system relies on only one criterion when interacting with the surrounding world: the need to be relevance-oriented. Basically, when interpreting, when accessing information, or when learning, we all engage in a cost-benefit procedure intended to obtain interesting information (named *cognitive effects*) in exchange for the least mental effort. This article starts with this relevance-theoretic premise, but also shows how the qualities of (now popularized) cyber-media alter the way this cost-benefit balance is assessed and how (ir)relevant outcomes emerge from people's cognitive interaction with these media.

Key words author
Cyberpragmatics, Relevance, Computer-mediated Communication.
Key words plus
Information Technology, Relevance (Information Retrieval), Telematics.

RESUMEN

La forma en que las personas interactúan con otros y acceden a la información ha cambiado drásticamente con la popularización de las "tecnologías de la información y la comunicación (TIC's)". Sin embargo, en la *teoría de la relevancia* Sperber y Wilson (1986) insisten en que nuestro sistema cognitivo se basa en un único criterio cuando interactúa con el mundo circundante: la necesidad de estar orientado hacia la relevancia. Básicamente, cuando interpretamos, cuando accedemos a la información, o cuando aprendemos, todos procedemos a una evaluación de coste-beneficio que pretende obtener información interesante (re-escrita como *efectos cognitivos*) a cambio del menor esfuerzo de procesamiento posible. El artículo parte de esta premisa de la teoría de la relevancia, pero también muestra cómo los atributos de los ciber-medios alteran la forma en que se evalúa este equilibrio de coste-beneficio y cómo se generan resultados (ir) relevantes a partir de la interacción cognitiva de las personas con estos medios.

Palabras clave autor
Ciberpragmáticas, relevancia, comunicación mediada por computador.
Palabras clave descriptor
Tecnología de la información, relevancia (recuperación de información), telemática.

A biologically rooted search for relevance

According to Sperber and Wilson's (1986) *relevance theory,* human cognition is biologically geared to the maximisation of relevance, to obtaining the most interesting information from the inputs available in a specific situation (Sperber & Wilson, 2005; Wilson & Sperber, 2002; Yus, 1998, 2003a, 2006). In the words of Wilson & Sperber (2002):

> As a result of constant selection pressure towards increasing efficiency, the human cognitive system has developed in such a way that our perceptual mechanisms tend automatically to pick out potentially relevant stimuli, our memory retrieval mechanisms tend automatically to activate potentially relevant assumptions, and our inferential mechanisms tend spontaneously to process them in the most productive way. (p. 254).

This cognitive evolvement is summarized in the so-called *cognitive principle of relevance,* stated as follows: "Human cognition tends to be geared to the maximisation of relevance". When interacting with the surrounding world, human beings cannot avoid applying this principle to any information that they process. Indeed, we cannot possibly pay attention to all the barrage of information that reaches us from the surrounding world, and therefore we constantly engage in relevance-seeking cost-benefit cognitive activities. Typical operations include (1) filtering of information which does not appear to be relevant (for example, when we do not recall most of the people who pass by us in the street but do remember those who, for some reason, stand out from the crowd); (2) identifying underlying intentions and attitudes in the actions (communicative or otherwise) of those who are around us (for example when someone approaches us and we cannot help wondering what intention underlies his actions); (3) combining new information with information already stored in our brain (essential in human communication to obtain interesting conclusions, see below); and (4) selecting from context only the information that might be useful in the extraction of interesting information (contextual information is vast but we have developed a capacity for accessing just the right information that leads to interesting conclusions).

Relevance is assessed in all kinds of inputs for processing, not only in verbal utterances (although linguistic communication is a very sophisticated way of transferring thoughts to other people). Sperber and Wilson (1986) want to propose a notion of relevance that is applicable to all sources of information. For example, we aim at relevance when we process information from the surrounding (physical) world. Inputs such as the ones listed in (1) below stand out from their physical context and are bound to be relevant:

(1) a. As I am walking towards my house, I see smoke coming out of one window.
b. As I am walking in the street, I see a man holding a gun.
c. As I am walking in the street, I see my wife kissing another man.

Besides, information which is already stored in our minds is also accessed in relevance-oriented ways. While we are engaged in thinking, some thoughts are more likely to be entertained than others. For example, in a situation such as (2), thoughts (3a) and (3b) are normally more likely to be entertained than (3c-g) (more *manifest* in relevance-theoretic terminology):

(2) The bell has just rung[1].
(3) a) Someone has rung the bell.
b) The bell in my house has just rung.
c) The person who is ringing is not a dwarf (he or she can reach the bell).
d) There has not been an electricity cut in my building.

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[1] Notice that the accessibility (*manifestness* in relevance-theoretic terminology) of some information depends on the contextual information. For instance, in a context where there has been a lot of electricity cuts recently, (3d) will then be more relevant and perhaps even more likely to be entertained than other thoughts which would be considered more *manifest* in normal circumstances.

e) The company providing electricity has not gone bankrupt.

f) Nobody has stolen my bell.

g) I have paid my latest electricity bill.

However, as pointed out above, the assessment of relevance that Sperber and Wilson are more interested in is the one taking place through linguistic communication and with underlying intentions. Whenever someone talks to us, we immediately rely on a basic *communicative principle of relevance*: "Every act of overt communication conveys a presumption of its own optimal relevance".

When this principle is satisfied (normally, any time anybody addresses us, but also in the case of documents such as novels, web pages, etc.), addressees engage in an interpretive task which aims at selecting the most appropriate interpretation from the range of interpretations that the utterance (or text) has in the current context of interpretation[2]. On paper, hearers will proceed as follows:

(a) Follow the path of least effort in constructing an interpretation of the utterance (and in particular in resolving ambiguities and referential indeterminacies, in going beyond linguistic meaning, supplying contextual assumptions, computing implicatures, etc.).

(b) Stop when their expectations of relevance are satisfied.

And for expectations to be satisfied, the selected interpretation should satisfy two conditions:

Condition (a): An assumption is relevant to an individual to the extent that the contextual effects achieved when it is optimally processed are large.

Condition (b): An assumption is relevant to an individual to the extent that the effort required to process it optimally is small.

These conditions do not imply that we never pay attention to inputs which are potentially effort-demanding or that we invariably reject interpretations which are more effort-demanding than other alternative interpretations. What they mean is that additional effort has to be compensated for by an increase in the number of cognitive effects (in the eventual higher "interest") that processing the input will produce[3]. For instance, in the following dialogue:

(4) Ann: Does Susan drink whisky?
Tom: (a) She doesn't drink alcohol.
(b) She doesn't drink whisky.

Reply (a) does not provide a direct answer to Ann's question, which means that there is a higher processing effort needed to interpret (a) than for a more straightforward answer like (b) (processing (a) requires Ann's extraction –from memory– of the assumption "whisky is an alcoholic drink" in order to conclude –as an implication– that Susan does not drink whisky). The explanation for choosing a more effort-demanding answer such as (a) is that Tom thought that his answer would provide additional interest (cognitive effects) that could not be obtained from (b), and that this interest would make up for the increased effort (in this case, the additional interest lies in the fact that Tom is not only replying that Susan does not drink whisky,

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[2] Optimal relevance of a stimulus is defined as a two-clause: An ostensive stimulus is optimally relevant to an audience only if: (a) it is relevant enough to be worth the audience's processing effort; and (b) it is the most relevant one compatible with the communicator's abilities and preferences (Wilson & Sperber, 2002, p. 256).

[3] This is, of course, a *qualitative* measurement of relevance. In theory, there should also be a *quantitative* notion of relevance, based perhaps on neuro-chemical mental steps taken during interpretation. But it is really difficult for analysts to assess relevance in purely quantitative terms and also for people in general when they are selecting the most interesting inputs. As Wilson & Sperber (2002) stress, it is highly unlikely that individuals have to compute numerical values for effort and effect when assessing relevance 'from the inside'. Such computation would itself be effort-consuming and therefore detract from relevance. Moreover, even when individuals are clearly capable of computing numerical values (for weight or distance, for example), they generally have access to more intuitive methods of assessment which are comparative rather than quantitative, and which are in some sense more basic (p. 253).

but is also providing a reason for this, unlike the more direct and effort-relieving answer (b)).

Besides, information is relevant when it interacts fruitfully with the information which is accessible to the addressee at the moment of interpretation. For example, relevant information is that which strengthens the hearer's existing information and also contradicts and eliminates existing information. But the most interesting source of relevance lies in the combination of new in-coming information and information already available in order to reach conclusions which are only obtainable from this combination and not from these sources taken separately. This may be the case of information which is not communicated intentionally, as in example (5)-(7) below, in which conclusion (7) can only be obtained by combining the visual input and already available information:

(5) New information (visual input):
A yellow Mercedes is parked near our department.
(6) Information already available (from encyclopaedic knowledge):
a. Professor Smith, who supervises my thesis, owns a yellow Mercedes.
b. Professor Smith usually takes the bus to university.
c. Only when he intends to stay at university till late in the evening does he drive his car to university (since there are no late buses returning to where he lives).
(7) (Relevant) conclusion (inferred by combining (5) and (6)):
This evening I will be able to discuss with him at length how my thesis is progressing.

This kind of combination is also typical of intentional linguistic communication. Although linguistic communication is more complex than simply combining external inputs and stored information, as in (5)-(7) above, and it has recently been argued that linguistic communication may involve a unique mental (pragmatic) module in charge of obtaining interesting conclusions from

linguistic inputs (see Sperber & Wilson, 2002), intentionally communicated utterances also demand combinations of new information and contextually available information, as in Tom's understanding of Ann's utterance in the following example:

(8) New information (verbal input):
Tom: There's a huge party next Saturday. Are you coming?
Ann: My parents are away on a trip this weekend.
(9) Information already available (from encyclopaedic knowledge):
a. Ann lives with her parents and her old, disabled grandmother.
b. It's usually her parents that look after her grandmother.
c. When her parents are away, she has to take care of her grandmother.
(10) (Relevant) conclusion (inferred by combining (8) and (9)):
Ann will be unable to go to the party on Saturday (since she has to look after her grandmother).

It is also worth noting that Sperber and Wilson's model envisages a much more unpredictable outcome for human interpretation than was previously predicted. Certainly, for linguists such as Saussure and advocates of the so-called *code model* of communication (e.g. the *mathematical theory of information*), speakers simply code information and hearers decode it without much informational loss. For the relevance-theoretic *inferential* model, on the other hand, hearers have to fill in, as it were, the informational blanks that exist between what the speaker says and what the speaker intends to communicate, which are normally different and related only in terms of *resemblance*. Actually, under the so-called *underdeterminacy thesis* (the claim that what people literally say is different from what they really want to communicate), there are two types of informational resemblance in human communication with gaps which have to be filled during interpretation (see Carston, 1996, 2000, 2002):

What the speaker intends to communicate with his/her utterance…
    [only resembles]
What the speaker literally says…
    [only resembles]
What the hearer interprets (selects as the intended interpretation).

Typical examples of "informational filling" are provided in italics in the following examples frequently found in the bibliography on this issue:

(11) I slept well. And you?
    I slept well [*last night*]. And [*how did*] you [*sleep*]?
(12) I haven't eaten.
    I haven't eaten [*this morning*].
(13) It will take time to fix your car.
    It will take [*longer than you'd expect*] to fix your car.
(14) Everybody left early.
    Everybody [*at the party*] left early.
(15) There's nothing on TV tonight.
    There's nothing [*worth watching*] on TV tonight.

An additional source of unpredictability in this *inferential model* of communication lies in the fact that utterances normally have different possible interpretations, all compatible with the words uttered by the speaker, which entails a picture of speakers communicating utterances with degrees of more or less plausible interpretations, and the task of the hearer lies in selecting the correct interpretation from a range of possible interpretations of the same utterance in a specific context[4]. Luckily,

hearers are equipped with a cognitive (relevance-guided) criterion for evaluating interpretations and this criterion is powerful enough to exclude all but one single interpretation, so that having found an interpretation that fits this criterion, hearers stop their interpretive strategy at that point.

A biologically rooted search for relevance (in cyber-media)

Since 2001 a research project called *ciberpragmática* (*cyberpragmatics*) has applied relevance theory to Internet-mediated communication (see Yus, 2001a, 2001b), both in intentional communication, such as conversations taking place in chat rooms (Yus, 2003b), and in texts which are simply available on the Internet to be processed, such as web pages. Specifically, cyberpragmatics analyses how language is used in the context of the new technologies of Internet communication, and also studies how users contextualize information (by actual senders or simply available on the Internet) when they infer meanings from what has been coded on the Net. The difference between the availability of contextual information in face-to-face situations and virtual encounters provokes different interpretive results or demands various degrees of mental effort to reach satisfactory interpretive outcomes. Cognitive pragmatics, and specifically relevance theory, is an appropriate framework for undertaking this cyberpragmatic task.

Among the general characteristics of cyberpragmatics, some are direct applications of the relevance-theoretic assumptions:

a) On the Internet, "addresser users" possess communicative intentions and design their utterances or texts in such a way that these intentions are successful.

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4   In order to select an adequate interpretation within this relevance-theoretic picture of communication, three sub-tasks have to be undertaken (Wilson & Sperber, 2002, p. 261): (a) construct an appropriate hypothesis about explicit content (in relevance-theoretic terms, EXPLICATURES) via decoding, disambiguation, reference resolution, and other pragmatic enrichment processes; (b) construct an appropriate hypothesis about the intended contextual assumptions (in relevance-theoretic terms, IMPLICATED PREMISES); and (c) construct an appropriate hypothesis about the intended contextual implications (in relevance-theoretic terms, IMPLICATED CONCLUSIONS). These sub-tasks are not sequential, that is, the hearer does not *first* obtain an explicature, *second* select

an appropriate context, and *then* derive implicated conclusions. For relevance theory, comprehension is an on-line process, with hypotheses about explicatures, implicated premises and implicated conclusions being obtained in parallel.

b) The "addressee users" resort to inferential strategies in order to obtain the most relevant interpretation, and these do not differ from the ones used in the interpretation of utterances in face-to-face interactions.

c) Users who send information on the Internet expect a certain degree of accessibility of contextual information and their addressees access contextual information as an essential part of their relevance-centred interpretive strategy.

d) The "material" (i.e., textual or discursive) qualities of certain information exchanged on the Internet (i.e., their attributes on the oral/written and visual/verbal interfaces, their brevity, lack of linear orientation, etc.) influence the accessibility of contextual information, the extraction of relevant information, the selection of the sender's intended interpretation, and the quantity of mental effort that users have to devote to interpretation.

In other words, Internet users do not rely on a different criterion when they evaluate interpretations, access contextual information, derive implications, enrich explicit content, infer emotional or attitudinal qualities attached to the messages, and identify underlying intentions. There is no Internet-specific *cognitive* or *communicative principle of relevance*. However, some qualities found in Internet discourses may affect the outcome of the users' communicative and interpretive strategies. Precisely, in this paper I will concentrate on this characteristic: the fact that certain qualities of cyber-media (web pages, e-mail, electronic mailing lists, discussion forums, chat rooms, weblogs, instant messaging, etc.) may alter the estimation of relevance (the combination of cognitive effects and mental effort, as pointed out above) in the information coming from or exchanged within these media, and may play a part in the (un)successful outcome of communication on the Net. In this sense, several prototypical situations will be listed below, many of which demand a re-writing of these two conditions of optimal relevance in communication as predicted by relevance theory.

Relevance in text-based communication

Nowadays, a great deal of the information which is exchanged on the Internet is still text-based (e.g. e-mails, weblogs, chat rooms, instant messaging) despite the fact that several context-enriching innovations have been developed in the last few years. This text-based communication lacks the richness of oral communication in situations of physical co-presence of interlocutors (there is a lack of oral and visual information from the interlocutor's nonverbal behaviour). Undoubtedly, there have been many advances in the attempt to enrich Internet communication (see next section), but in general text-based communication is still the norm not only on the Internet but also in other media such as SMS communication between mobile telephones.

This lack of oral qualities that Internet-mediated conversations exhibit may generate additional processing effort when searching for a relevant interpretation (similar effects are obtained but the user has to work harder to retrieve them in text-based communication). As illustrated by D. Wilson (personal communication, 2006, 2007):

> Imagine exactly the same information being presented, first in a clearly printed form; second as a faint photocopy; third as an illegible handwritten scrawl; fourth translated into a language you read only with difficulty. Each of these versions may have exactly the same cognitive effects for you, but each will require different amounts of processing effort. Although they carry exactly the same information, you will have to work harder to retrieve it from one input than from another, and this may affect your intuitions of relevance, and indeed, your willingness to attend to a particular input at all.

As a consequence, "addressee users" have to devote supplementary mental effort to obtaining some cognitive effects which would have been much easier to retrieve in a more contextualized situation (i.e., with more support of oral and visual nonverbal information). As pointed out above, communication involves a "gap-filling" activity

on the part of the addressee since what speakers encode is different from what they really intend to communicate. Two gaps, which were mentioned above, have to be filled by the user's inference. They are reproduced again below for convenience:

What the speaker intends to communicate with his/her utterance…
[only resembles]
What the speaker literally says…
[only resembles]
What the hearer interprets (selects as the intended interpretation).

However, in text-based Internet communication, there are more gaps to be filled inferentially, generating more mental effort devoted to obtaining similar cognitive effects:

What the Internet "addresser user" intends to communicate with his/her utterance…
[only resembles]
What the Internet "addresser user" would have said (in a face-to-face situation)…
[only resembles]
What the Internet "addresser user" actually encodes (i.e., types on the keyboard).
[only resembles]
What the Internet "addressee user" would have listened to (in a face-to-face situation)…
[only resembles]
What the Internet "addressee user" actually reads (on the computer screen)…
[only resembles]
What the Internet "addressee user" interprets (selects as the intended interpretation).

This increased effort is especially evident when trying to communicate attitudes and emotions through typed text (cf. Yus, 2005a). In general, and as a consequence of what can be labelled *funnel effect*, we store more emotions, feelings and attitudes than words in our language to communicate them. In face-to-face interactions we can monitor the oral and visual qualities of the speaker's utterance and measure the extent of the speaker's emo-

tions and feelings (for *social neuroscience,* through this monitoring our brain can even mirror what is happening in our interlocutor's brain). In cues-filtered media such as e-mail, the lack of nonverbal channels can lead to misunderstandings due to an inability to measure feelings and emotions as they are poorly described through words on the Internet.

In this sense, *cyberpragmatics* studies innovative ways of compensating for the lack of information coming from the oral and visual qualities of nonverbal communication. One typical example is what was labelled *oralized written text* in Yus (2001a) and *textual deformation* in Yus (2005a), a quality of texts half-way between written and oral communication and which is found very often in chat rooms and instant messaging:

(16) < Diablillo_21 > alguna xica simpatica
< ^ Miryam3l^ > ainsss asias carino MuA-aKks
< silvya31 > uis clk que pasa que to rajas??? jjejejeje
< HeRMaNo > apartir de ahora shhhhhhh
< Ri > amigocam…………… yo toi vestido

In Yus (2005a), a survey was given out to students and it revealed that Internet users are rather bad at distinguishing different levels or shades of emotion in other users' utterances. Although they intuitively infer that a higher intensity of feelings or emotions underlies textual deformation, they were unable to ascribe degrees of feelings or emotions related to an increased amount of textual deformation. In other words, they interpreted that there was more emotion in (17b-d) than in the unmarked (17a) and in (18b-c) when compared to the normal unmarked emoticon (18a):

(17) a.   < RuBiOWaPo > Hola
b.   < patricia > hola¡¡¡¡¡¡¡¡¡¡¡¡¡¡
c.   < chico_20 >   hhhhhhoooooooollllllll-llllllaaaaaaa
d.   < sevillana14 > holaaaaaaaaaaaaaaaaaaaa aaaaaaaaaaaaaaaaaaaaaaa

(18) a.   < Quesalid >   :-)
   b.   < luisito40s > :-)))))
   c.   < mariluz > :-)))))))))))))

But, at the same time (and contrary to my expectations), the students could not identify increasing levels of feelings or emotions attached to a higher amount of typed text. For instance, (17d) was not found more emotion-connoted than (17b) even though the user had typed more *deformed text* in (17d) than in (17b). Similarly, the students found differences between (18a) and (18b) (the latter more connoted with emotion), but found no difference between (18b) and (18c) even though the latter exhibits more *deformation*.

Besides, the design of the interface for Internet-mediated communication can also generate increased processing effort in exchange for the same amount of cognitive effects. For instance, chat room interfaces exhibit several qualities which prevent optimal communication among users by increasing processing effort. These qualities have been the subject of research within cyberpragmatics (see Yus, 2001a, 2003b, 2003c). Among them, we can list the following: (a) users always enter the chat room and find a screen filled with conversations which have already been initiated; (b) the users' messages end up mixed up with the messages automatically generated by the system (e.g. announcing who has left or arrived at the chat room); (c) on the right-hand side of the screen there is usually a list of those users who are currently in the chat room (represented as *nicks*), but many times these are fake nicks which in reality link to an advertisement; (d) the server reproduces all messages in strict order of arrival, which generates a screen filled with unintelligible message sequences with no logical ordering and which disappear rapidly from the screen (the so-called *scroll factor*); (e) in the common (initial) area of the chat room the messages with a specific addressee are mixed up with general messages to the crowd; (f) conversational threads are also tangled up and it is really difficult to follow a conversation; and (g) some messages are "truncated" and sent by the

users in two different messages, but the server will not necessarily reproduce them next to each other.

Consequently, the two conditions of relevance are somehow altered in this kind of text-based interaction:

Condition (a):   An assumption is relevant to an individual *even though* the contextual effects achieved when it is optimally processed *are often reduced due to the lack of contextual information available to the users*.

Condition (b):   An assumption is relevant to an individual *despite the fact* that the effort required to process it optimally may be *higher than in face-to-face interaction due to the characteristics of the interface*.

Relevance in (improved) text-based communication

In the last few years, several improvements have aimed at providing richer contextual information for those who engage in text-based interactions. These include a better organisation of conversational threads, the inclusion of more realistic *emoticons* and, more recently, the systematic use of avatars in 3D scenarios, as in the famous *The Palace* and *Second Life*. However, advances in options for contextualisation sometimes require a higher command of technology and demand more effort. For instance, managing the nonverbal behaviour of avatars in *Second Life* has proved very tiring for many users, and the balance of relevance ends up shifting to the negative side due to increased effort with no substantial reward in exchange. This aspect was also corroborated in a survey given out to students in Yus (2001b). Although students were given the choice of contextually richer environments for interactions, they systematically preferred the traditional text-based interactions, for reasons of security, privacy (not giving away personal information) and ease of use. Again, alterations in the two conditions of relevance are generated:

Condition (a):   An assumption is relevant to an individual to the extent that the contextual effects achieved when it is optimally processed (*with the amount of contextual information available within the interface*) are large.

Condition (b):   An assumption is relevant to an individual to the extent that the effort required to process it optimally is small *and the effort demanded by several improvements for contextualisation (provided by the interface) does not exceed the cognitive effects which can be obtained in return.*

Relevance in texts adapted to the Internet

When texts which are initially published outside the Internet are transferred to the online electronic format, they often have to be adapted in order to reach similar balances of relevance as the ones initially obtained when these texts were first published.

A good example is the press. Newspaper authors have to predict accessibility of contextual information and the range and extent of cognitive effects for their readers when they write their stories, especially at a time when access to more immediate sources of information (e.g. television) has spread universally. In Yus (2003d) the following example is provided:

(19) a.   El Columbia se desintegra poco antes de tomar tierra (*Información*, 2-2-2003, 1).

b. Bush promete continuar los vuelos al espacio a pesar del desastre del 'Columbia' (*El País*, 2-2-2003, 1).

Both headlines were published on the same day and deal with an accident that took place the previous afternoon. Although it was very likely that most readers would already know about the accident the next day, the author of (19a) designed his headline with the hypothesis that the headline would be relevant to the reader by providing new information about the crash, while the author of (19b) presupposed that the reader would already know that the Columbia had crashed and hence

expected that relevance would arise by giving extra information about the accident (Dor, 2003).

Readers of cyber-news also assess the relevance of the information that they are reading, but the way the text is presented and the availability of contextual information in both media (printed vs. online) may alter the balance of cognitive effects and processing effort and hence the user's eventual satisfaction. Indeed, several years ago newspapers used to transfer the printed information to the online version literally with no changes, but they soon realized that the reading activity is very different and the (ir)relevant outcomes also differ[5] for a number of reasons:

(a) Firstly, the screen plays an important part in the user's satisfaction. Texts which reach beyond the borders of the screen and require *scrolling down* are more tiring than texts that fit on the screen. This is why online papers tend to cut up their stories into smaller but link-mediated texts.

(b) The Internet provides newspapers with the possibility of immediacy, of presenting news items right after they take place, whereas printed papers have to stop printing at a certain time of the day. Readers of the cyber-paper will demand more up-to-date information or they will find it irrelevant.

(c) Thirdly, online newspapers allow for a higher level of interactivity, and readers may obtain additional cognitive effects from being able to exchange points of view with the newspaper.

(d) Finally, the readers of printed newspapers do not have access to additional information while they are reading, but readers of the online counterpart can access several sources of

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[5]   Something similar happens with advertisements, which used to be transferred to the new online environment as *banners* with little success (see Yus, 2005b), since they prevented users from reading comfortably. Nowadays, banners are made up of Flash technology and have adapted to the online medium. They are hyper-personalized, meeting specific users' needs or even asking for the users' participation in their eventual success. In this case, users will willingly increase their mental effort in exchange for a more personal interaction with the ad and a more personal reward.

information while reading: "search engines" such as *Google*, the newspaper's archive, the search option within the newspaper in order to get more information regarding an event, multimedia additions (videos, graphs…), etc. The eventual relevance of what the reader processes online comes from a combination of different sources of information, rather than from a linear reading of the piece of news.

All of these differences lead to another alteration of the initial conditions of relevance:

Condition (a): An assumption is relevant to an individual to the extent that the contextual effects achieved when it is optimally processed are large.

Condition (b): An assumption is relevant to an individual to the extent that the effort required to process it optimally is *not uselessly increased by the quality of the interface (either because the text processed has been literally transferred to the online medium or because the additional sources of contextual information do not offer supplementary interest in exchange for this effort).*

Relevance in link-mediated discourses

Web pages typically contain links to other texts or discourses which are either in the same document or elsewhere. On paper, there may be no *intended* interpretive path for these texts, since the reader has to construct inter-connected texts with no help from the author. In this case, we can provide two types of relevance conditions involving processing effort, one *quantitative* (condition (b1)) and one *qualitative* (condition (b2)):

Condition (a): An assumption is relevant to an individual to the extent that the contextual effects achieved when it is optimally processed are large.

Condition (b1): An assumption is relevant to an individual to the extent that *the number of clicks that the user has to make in order to obtain these effects is small.*

Condition (b2): An assumption is relevant to an individual to the extent that the *level of coherence obtained from linking different bits of information is optimal despite the non-linear arrangement of the linked texts.*

Certainly, one of the main complaints of website users refers to the difficulty in obtaining the expected information, for example in corporate web sites. This difficulty –with additional processing effort- can be measured in terms of number of clicks but also in the maintained or missing coherence between the different pages or texts that the user accesses.

In this sense, several qualities of the interface can affect both the number of clicks and the level of inter-link coherence achieved in the user's reading paths. One of these qualities has to do with the arrangement and interrelation of hyperlinks. For instance, in Reitbauer (2006) three kinds of link arrangements are suggested: *linear structure* (a simple conversion of a traditional linear text into hypertext); *axial structure* (characterized by a sequence of central nodes which serve as centring axis and recommend a specific reading path, normally with the aid of screen frames); and *network structure*, which provide readers with greater navigational freedom. Needless to say, as the reading strategy becomes less fixed (and less author-supported), it is also more open to personal interpretations and the danger of increased effort (through useless clicks or incoherent reading paths) increases accordingly.

Another factor that may influence relevance in link-mediated discourses, both in its quantitative (number of clicks) and qualitative (coherence between chunks of text related by links) sense is the level of familiarity with the Internet genre, which may diminish or increase the effort required to access relevant information.

An interesting example of how familiarity influences relevant outcomes can be found in weblogs. In Yus (2007a) it is argued that weblogs have stabilized their own genre with identifiable features that readers can store in their minds and also expect to find before the weblog is accessed.

These features are reinforced and stabilized whenever they are repeatedly found in the weblog and, as a result, the users build up more fine-grained cognitive expectations as to what kind of discourse and information will be found. That is, the initial identification of the weblog genre should aid the readers in building up particular expectations concerning the type of information they are about to find and process inside the weblog and, at the same time, it should also reduce the number of clicks required to access the interesting information and also the effort demanded to obtain an adequate level of internal coherence in link-mediated chunks of text. Besides, if some verbal or visual features of weblogs trigger weblog identification and favour subsequent inferential paths, readers will invariably expect to find them whenever they access a web page which is a candidate to be labelled a weblog. In other words, in this study it was predicted that expert readers store in their minds a "cognitive schema" made up of prototypical weblog layout and elements (what was labelled *internalized weblog schema*).

The formation and updating of the readers' weblog schemas are also accelerated by the existence of easy-to-use software templates that are offered by companies such as *Blogger*. The fact that a substantial number of bloggers resort to these templates favours the formation of default schemas in bloggers and readers. In a way, this stabilising process can be compared to an epidemiology, since many bloggers will use templates because they are willing to fit into the blogging community, and hence the use of these templates will spread and be expected eventually by most members of the community of bloggers.

On the other hand, although the expected balance is always in terms of "highest effects in exchange for least effort", on the Net we can also find surprising balances generating striking degrees of relevance for users. One of them has spread recently and surprised researchers: the optimal relevance related to few or no cognitive effects in exchange for little or no processing effort. This "little interest in exchange for little effort" is the case of very popular web sites that are very boring

but, for some reason, get thousands of visits every day. These include watching how a Cheddar cheese matures or how hens move about on a farm and lay eggs[6]. In all of these cases, the effort demanded to obtain the information is minimal (or zero), but the information provided is also minimal. It may be, as mentioned in Burkeman (2007), that we suffer a lag in which the slow horse of human comprehension is unable to keep up with the fast horse of the information that is available on the Net, and maybe dull websites are popular because they are a rebellion against information overload, a space for our slow horses to graze. But this trend is also a challenge for a relevance-based account of human communication, since the two conditions of relevance do not predict such unusual balances.

Relevance in the community

Nowadays there is a great emphasis on information created by Internet users in a kind of collective achievement that finds satisfaction in the communal creation and consumption of information. Several labels have been proposed for this trend, including *social software*, *Web 2.0*, *user-generated content*, etc.; and several portals have achieved cult status by providing an environment for this collective achievement, including *Wikipedia*, *Facebook*, *MySpace*, *Second Life*, *YouTube, Flickr* and fully interactive weblogs, among many others.

In this case, the reward obtained by contributing to collective information, by getting a feeling of community membership (Yus, 2007b), by engaging in phatic interactions which stress social bonding over personal information provide the necessary cognitive effects required to compensate for any effort that these communal activities might demand in exchange[7]. Needless to say, this is a special balance of relevance in which "effort" is no longer on the *processing* side but on the *producing* side:

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6   The former at [http://cheddarvision.tv/]; the latter at [www.hencam.co.uk].

7   Small wonder in 2006 *Time Magazine* selected the Internet user who is engaged in collectively generated information "person of the year", since these users "control the Information Age".

Condition (a): *Socially generated information* is relevant to an individual to the extent that the *social benefit* achieved when it is produced is large.

Condition (b): *Socially generated information* is relevant to an individual to the extent that the effort required to produce it *does not threaten the user's satisfaction at being engaged in collectively generated content.*

However, these social qualities of information may also have negative effects when "effort" is analysed from the processing side. Certainly, several aspects of this user-generated content may drastically alter other users' estimation of relevance, as in the following cases:

(a) On the Internet, user-generated content is not backed up by an authority or trustworthy source which guarantees that the information accessed (and the cognitive effects obtained) deserves processing. This is the main argument of the controversial book by Keen (2007)[8]. For this analyst, who explicitly argues against the reliability of collective achievements such as *Wikipedia*, the lack of an authority which backs up the importance of certain information leads to a massive amount of useless information and a whole generation of users with access to thousand of articles but who are, at the same time, dominated by stupidity. Since in this case the users' estimation of relevance is not really altered (they appear to get enough reward -in cognitive effects- in exchange for the effort they make to access this information), and they do not realize that the benefit they are getting does not have the necessary quality, this would perhaps be an example of what can be labelled *exogenous relevance*. This is a term that experts such as Keen, who know that the balance of effects and effort for information on the Net is not adequate, would use. And this kind of relevance would be different from the users' individually achieved *personal relevance*, which remains unaltered despite the lack of an authority pointing out which information may be labelled "interesting".

(b) For many users, being in the community of user-generated content is, in itself, a positive source of satisfaction, beyond contributing positively to the quality of this content.

(c) User-generated news portals (for example the Spanish *Menéame* and *Frisqui*) are being criticized for their anarchic process of publication which does not guarantee the trustworthiness of those pieces of news which nevertheless achieve popularity.

Effort-increasing interpretations due to anti-social uses of the Internet

Sometimes what can be generically labelled "anti-social uses" of the Internet increase the effort required to access information with no offset of cognitive effects. One of these uses has already been mentioned in passing: the annoying advertising messages that often pop up when the user of a chat room clicks on a *nick* in search of a private conversation. This unpredicted outcome of clicking produces an increase in the overall mental effort required to deal with the chat room[9]. Other anti-social uses include: (a) *spam* in electronic mail, hundreds of unsolicited e-mails which fill up the mailbox and make it more difficult for the user to select the really important messages; (b) news portals which are filled with messages about (only apparently) newsworthy events which distract rea-

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[8]   And, many years ago, by Umberto Eco when he pointed out that, for lack of an authority who selects which information is worth processing and which is not, on the Internet the reader has to take full responsibility for filtering information. Authority is also essential for Sperber's (1997) proposal of how "reflective beliefs" are formed, since their credence is enhanced by a validating source of authority (unlike "intuitive beliefs"); for instance the authority of parents or teachers. Their strength varies from mild opinions to strongly held convictions.

[9]   In general, technology and program interfaces add a supplementary layer of effort when users engage in Internet-mediated interactions. A greater or lesser command of computer software and the different commands that have to be used will generate different degrees of effort that may even overcome the cognitive effects that the user might get in those interactions. Nowadays, though, icon-based interfaces and greater skills in today's users have reduced this additional effort enormously.

ders from the really interesting and objective news; and (c) assaults on *Wikipedia* in order to change articles and reduce the user's trust in the content of the encyclopedia.

Reiterative relevance

As a final point, a hypothesis may be put forward regarding today's use of cyber-texts. For lack of empirical support, I can only base this hypothesis on my personal contact with my students (who are totally familiarized with today's communication technologies such as the mobile phone, the Internet, etc.).

In short, the hypothesis is based on the possibility that a systematic repetition of a certain type of balance between cognitive effects and processing effort may lead the Internet user to reject other informational inputs whose processing demands different (normally more costly) balances of relevance. This is particularly noticeable in the repeated processing of short texts on the Internet. Indeed, nowadays there is a greater tendency to access and process very small texts such as SMS, posts to weblogs, news items sent to the PDA or to the mobile phone, short messages sent to chat rooms, e-mails, instant messaging, etc. In all of these cases, the mental effort required in exchange for the number of cognitive effects is always very low, given the small amount of text to be processed. Therefore, it can be predicted that a reiteration in this kind of effort-relieving processing of Internet texts might lead to a reluctance to devote the supplementary effort required by longer texts. This may have important consequences on how texts are organized and interpreted in a future where communication will be massively dependent on the Internet.

Concluding remarks

Although searching for relevance is a biologically rooted cognitive activity in human beings, the way relevance is estimated (systematically applying a cost-benefit procedure between interest -in terms of cognitive effects- and mental effort) depends enormously on the qualities of the medium through which communication is established. Specifically, on the Internet, several qualities of the medium (and how the medium is exploited) produce alterations in the way this cost-benefit balance is obtained and, eventually, in the way relevance is assessed. In this paper several of these possible alterations have been outlined, but the non-stop development of new forms of interaction through the Net (including more contextualized versions of traditional means of Internet communication) will no doubt have an effect on whether these alterations remain or disappear in the near future.

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