Computer-mediated language learning: Making meaning in multimodal virtual learning spaces

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This article argues that when using Internet-based computer-mediated communication technologies for language teaching and learning (e.g. email, internet relay chat, or, more recently, instant messaging and audio-conferencing), it is not sufficient to see the new learning spaces as replicates of conventional face-to-face settings. We suggest that it may be useful to consider how meaning is made using the modes and media available in electronic environments. This approach offers a new framework for the investigation of both the limitations and the possibilities of the new information and communication media and the modes they afford. It incorporates notions of design, authorship and dissemination, and the increasing importance of modes other than writing in virtual language learning spaces and can thus also contribute to an enhanced understanding of the phenomenon of new literacies. In this article we seek to demonstrate how this framework can inform the development of language learning and teaching in Internet-based environments, using an audio-graphic conferencing application as an example. We examine some of the demands made on tutors and learners and consider ways of meeting the arising pedagogical challenges.

Technology has made it easier for many of us to communicate with others instantly and over a distance, with the new channels of communication offering us new ways of combining different modes such as text, audio and graphic within one medium – the personal computer (PC). These developments have had repercussions for second language teaching and learning – not just in distance educa-tion. Yet as Salaberry (2000) points out, if we want recent developments to constitute more than just a quantitative increase in interaction and a more obvious focus on

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pedagogical principles than in the past and bring about qualitative changes instead, the fol-lowing needs to be done:

> *Materials designers need to assess critically the effects of the technological capabilities of Computer Mediated Communication (CMC) as well as the features that characterize a potentially new type of literacy. Such a critical assessment will have to be based on the analysis of how specific pedagogical objectives are achieved through the design and imple-mentation of instructional activities in CMC environments. (p. 28)*

It is therefore not sufficient to see the new learning spaces as replicates of face-to-face classroom settings. Instead, we also need to take into account the fact that communication is mediated by the computer, thus factoring in the modes and affordances that the com-puter offers and considering how meaning is made in these new multimodal environments.

Multimodality – which Kress and van Leeuwen (2001) define as "the use of several semi-otic modes in the design of a semiotic product or event, together with the particular way in which these modes are combined – they may for instance reinforce each other […], fulfil complementary roles […] or be hierarchically ordered" (p. 20) – has always been part of meaning making. However, within Western society, especially in the context of education, there has been a "dominance of writing as *the* means of communication and representa-tion" (Kress, 1998, p. 58). This dominance has lessened the significance of other modes. "The recent re-emergence of the visual has to be understood in that context: not as new in itself, but as new in the light of the recent history or representation, and of the nearly unshakeable commonsense that developed along with writing's preeminence" (Kress, 1998, p. 60).

Over the past decades the visual mode (whose grammar is governed by simultaneity and spatiality) has been regaining ground and the current shift from the book to the screen contributes to this development, thus moving us "from print to post-print text cultures." (Lankshear, 1997, p. 3). Kress (2003) goes as far as talking about a "revolution in the uses and effects of literacy and of associated means for representing and communicating at every level and in every domain" (p. 1). In the context of language acquisition, Stein (2004) therefore advocates "multimodal pedagogies" (p. 95) challenging the hegemony of language, particularly written language, in ESL classrooms.

The first section of this article examines the concept of multimodality and issues around literacy in general. Next we apply these general considerations to CMC and explore the practical implications for language teaching and learning in virtual multimodal environments. In the third section we consider the demands made on tutors and learners and explore how they could be assisted in making meaning in such environments and in developing elec-tronic literacy, using an Internet-based audio-graphic conferencing system as an example. In the final section we draw some preliminary conclusions and point to issues that remain to be addressed.

Different modes for making meaning

According to Halliday (1986), speaking and writing are used to make meaning differently and in different contexts; they are thus different ways of knowing and hence different ways of learning. Yet spoken language was not taken seriously for a long time, and only recently

"we have passed the peak of exclusive literacy, where only written artefacts had merit, and information resided only in the written message" (p. 98). He attributes this to the invention of the telephone. The popularity of television as well as more recent developments in computing show how writing is becoming even less dominant today as it competes with spoken *and* visual language.

In view of these changes in our so-called age of digitization – where we have witnessed a move from the dominance of writing to the dominance of the image, from the book or the page to the screen – Kress and others (see Kress and van Leeuwen, 2001; Kress, 2003) have further developed Halliday's ideas about making meaning. They see language as a complex system made up of written, spoken, visual and bodily resources (or 'modalities'), each with their own materialities and affordances for making meaning. Thus language is made up of different, "independent meaning-making systems, which are however co-ordinated so as to produce a single, if complex, integrated and differentiated text-message" (Kress, 2000b, p. 186). Today, the new media offer us the possibility to combine a variety of different modes in the making of texts[1]. Compare our situation with that of 50 years ago, when – other than writing by hand – all that people had access to in terms of two-way representational resources for communication over a distance was a typewriter, telegraphy and perhaps a telephone. Not only do we have a greater variety of media available today which offer different modes for making meaning but the computer also allows us to combine these modes more easily in an "orchestration of meaning" (Kress, Jewitt, Osborne, & Tsatsarelis, 2001). Moreover, the new meaning-making systems are not only available to a select few but the development of the electronic media, the fact that they are becoming increasingly cheaper and easier to use and their ensuing growth have meant that a large proportion of people in the Western world now have access to a multiplicity of modes for communication.[2]

Yet at the same time, the new technologies can also be seen to limit the way we make meaning. Cook (2003), for example, in an abstract of a paper entitled 'Various shades of grey' takes a less enthusiastic stance towards the new media and the modes they allow us to use:

> What has been gained through new technology is an enhanced ability to relay acts of communication; what has been lost are the modalities of objects, bodily presence, timing, space, weight, temperature, light and dark, touch, taste, smell, inebriation, and internal bodily sensation. What remains are often reduced acts in which the only modalities are those of writing, vision, and sometimes sound. 'Bi-modal' or 'tri-modal' might be more accurate terms for them than 'multimodal'. (n.p.)

Kress and van Leeuwen (2001), however, claim that the "new technologies' emphasis on multimodality, three-dimensionality and interactivity can be seen as a return of many of the things that were lost in the transition from 'orality' to 'literacy'" (p. 92). Communication in today's virtual environments is characterized much less by formal writing than by casual chatting, both in written and spoken form. Such environments also empower their users by giving them access to tools which enable them to design, author and publish their own

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1 The word 'text' is used here in the wider sense of any artifact produced with the help of representational resources.

2 For a current discussion of the digital divide, see van Dijk, 2005.

multimodal texts in, for example, blogs or wikis. In the context of education, Warschauer (1999) concludes that ''the decentered, multimedia character of new electronic media facilitates reading and writing processes that are more democratic, learner-centered, holistic, and natural'' (p. 11). Influenced by The New London Group's (1996) programmatic publication on multiliteracies, Kress (2000a) sees the wider implications of such a view of multimedia communication and representation as follows:

> *This newer theory of representation may prove adequate to the demands of several urgent tasks posed by wide social and economic changes, including the electronic technologies: the need for dealing with constant change; the need to treat individuals as agentive in relation not only to the production of their textual objects but also in relation to their constant remaking of their community's representational resources; the interaction of many semiotic modes in a text; and to do so from both the maker's and the reader's point of view. (p. 158)*

Stein (2004) takes this up, pointing out that ''a semiotic theory that does not have an account of change at its core is inadequate to account for the ways in which the new information technologies are changing the landscape of communication'' (p. 109). She thus argues strongly against theories of representation which see meaning making as ''transmission, reproduction, or personal interpretation'' (p. 109) and emphasizes the importance of the transformative activity of redesigning. ''Through this process of design, culture is both sustained and transformed'' (p. 110).

In this theoretical framework of multimodal meaning making, people are seen as agents who are making meaning and producing texts and who are also constantly remaking the representational resources in the process. The result is a situation of permanent change based on the ''interested actions'' of individual makers of texts or messages. Stein (2004) defines this ''interest'' as ''a complex combination of the demands of the particular social occasion in which the text is produced including – among other things – contextual constraints of production'' (p. 106)[3]. As a consequence, makers of text ''stretch, change, adapt, and modify all of the elements used'' (Kress, 2000a, p.155). Mobile phones are an obvious example for this process. Instead of using the speech facility, many users prefer the texting device – despite its obvious shortcomings (limitations in size and typing speed) – and consequently a whole new written mode has developed. Another example can be found in Palfreyman & al Khalil (2003) who describe Arab students using the Latin alphabet to write vernacular Arabic for 'secret' online messages. According to Kress (2000a), we should therefore no longer be talking about language use, but about the ''constant remaking of resources in the process of their use'' (p.156). For it is the individuals' needs and interests with their personal, cognitive, affective and social dimensions that together with task and institutional demands determine the direction of the remaking of the resources available to them – a process which Kress calls 'design' (Kress, 2000c, p. 340).

The new media have drastically changed conventional ideas of authorship on the one hand and of stability and authenticity of produced texts on the other. As Kress (2003) points out, the bi/multi-directionality of communication that the new media afford means

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3 Although Stein explores those constraints mainly in terms of the historical and socio-political context in which individuals and groups operate, her considerations do, in fact, also apply to the representational resources available in new media.

that authorship is no longer rare, making for greater democracy and a levelling of authority. At the same time, designing and editing texts in collaboration also means that authorship is not always clear-cut, and representations often have a more provisional nature. The new media also facilitate easy dissemination – for example, via websites, weblogs (blogs) or podcasts. Thus ''the new technologies of information and communication bring together resources for representation and their potential with the resources of production and the resources of dissemination'' (Kress, 2003, p. 23) within one tool.

These developments have resulted in a transformation of our concept of literacy. As Warschauer (1999) points out, ''technological developments alone cannot account for changing conceptions of literacy. Rather, we must also take into account the broader social, economic, and political context'' (p. 8). He calls it 'electronic literacy' (Warschauer, 1999); other terms used are 'technoliteracy' (Erben, 1999), 'technological literacies' (Lankshear, 1997) or 'new literacy/literacies' (Salaberry, 2000; Lankshear & Knobel, 2003).

With regard to learning in computer-mediated environments in general and CMC-based language acquisition in particular this implies creating a context where users of the new media can develop such literacies, taking advantage of the possibilities that are offered to them. In order to do so, we have to move away from an instructivist, teacher-led approach and take on sociocultural theories of learning which are based on notions such as the centrality of interaction with others and the situatedness of learning. Tutors have to learn to give up control in favour of their students; learners, who are more familiar with hierarchical and instructivist learning contexts, need to learn how to make the most of the democratic and learner-centred features that are inherent in many of the online environments available today.

CMC: Media and modes for language teaching and learning

Royce (2002, p. 92) summarises some of the consequences of the new developments for language education:

> If making sense of (and constructing) texts requires the ability to understand the combined potential of various modes for making meaning, TESOL professionals need to be able to talk and think seriously about multimodal communication because they need to help learners develop multimodal communicative competence.

Although Royce limits his statement to face-to-face teaching and learning of English, it is also true for other languages, and applies to virtual environments. Yet as Chun and Plass (2000) comment, ''networked environments that allow learners to communicate using the full range of multimodal forms are relatively new'' (p. 165), and we are only gradually finding out about the possibilities and constraints of CMC. What has happened to other media – that ''in the history of […] teaching each mode has been worked (shaped) differently to realize meanings appropriate for these purposes'' (Kress et al., 2001, p. 13) – has only just started in relation to the new media. Thus, our practice is often characterised by trial and error, with a 'culture' only slowly developing and research is all the more important.

When comparing the modes and media of CMC with face-to-face instruction, the following similarities stand out. Both allow for multimodal representation (speaking, writing, using images), and both involve interaction with others (tutors, other learners, native speakers). It is therefore tempting to think that CMC can replicate a conventional classroom, especially

when we consider that it can incorporate a whole range of seemingly familiar modes – text, audio and graphics (e.g. still as well as moving images). Yet as Kress (2003) states, it is vital "to understand the meaning-potentials of the resources as precisely and as explicitly as we can" (p. 24) and to do so "we need to attend to the *materiality* of the resources, the material *stuff* that we use for making meaning" (p. 32). In CMC-based teaching and learning the 'material stuff' is the computer with its new possibilities for representation and communication. This includes the way in which modes can be combined and the way they function (e.g. in time with respect to the speed of communication over the Internet, or synchronicity/asynchronicity).

In *written computer conferences* text can be dealt with quite differently compared to more conventional communication over a distance or face-to-face settings. Learners can create text not only individually but also jointly as well as manipulate it easily. They can import it from other documents, save and retrieve it and exchange it electronically with other users. The fact that in synchronous written chat several participants can write at the same time creates a very different kind of discourse (including, e.g. different threads) compared with face-to-face settings. The speed with which messages can be exchanged also has an effect. Chat exchanges (and even asynchronous email) are much faster than conventional written exchanges, thus moving away from the 'language of distance' that characterizes conventional written language and approximating oral language (see Weininger & Shield, 2003). At the same time there is the lack of conventional paralinguistic cues which play a major role in spoken language in face-to-face settings, a lack which has given rise to other means of communication such as emoticons.

Graphical elements in CMC-based conferencing environments (in MOOs, e.g.) offer resources for making meaning by including the visual mode. Images can be created or imported and subsequently edited both by individuals as well as groups of learners. Icons (such as smileys and other emoticons) also act as means of communication.

Audio conferencing offers yet another mode. Although synchronous audio seems to resemble face-to-face communication, the lack of body language in voice-over-Internet exchanges has an impact on the nature of the interaction. Turn-taking, for example, is less straightforward than in a face-to-face setting and participants have to work out new strategies in order to sustain the communication flow. Lack of bodily representation also requires new ways of fostering socialization and community-building.

Using a *webcam or video* introduces body language into computer conferencing and entails new possibilities that are unknown in conventional face-to-face interaction. A videoconferencing tool like NetMeeting, for example, enables users to simultaneously see their interlocutors as well as a small image of themselves on the computer screen.

Today, these different resources can be combined into integrated virtual environments (e.g. in audio-graphic or videoconferencing applications), allowing users collaboratively as well as individually to represent their own meanings by writing, speaking, drawing and up- or downloading pictures. As well as giving them access to a vast range of materials on the Web, these environments allow for almost unlimited communication and interaction with the help of resources which are only a mouse-click away.

As a result all four language skills (i.e. reading, writing, listening and speaking) can be developed and practised. Synchronous written conferencing is a useful tool for collabora-

tive written interaction (Kitade, 2000) and – because of its synchronicity – it is also a forum where learners can prepare for spoken interaction. Audio and video conferencing allow for communication and joint production using both written and oral language. With the help of blogs, which are both production and dissemination tools, learners can discuss issues either privately or publicly on the Web. MOOs give students the opportunity to create virtual spaces on the Web jointly with others using graphics and written text (see Peterson 2001 for an examination of a number of MOOs dedicated to language learning). They thus allow students to interact and negotiate meaning (e.g. Schwienhorst, 2004) as well as rehearsing oral skills (Weininger and Shield, 2003). Wikis are websites where visitors can add content or change the existing content. The latest development is podcasting whereby initially amateurs produced audio texts which could be downloaded from the Web. This has expanded gradually to allow users to up- and download a whole range of audio texts. Godwin-Jones (2005) describes the technology and outlines its actual and potential uses in language learning.

So while it is true that in a number of respects CMC is restricted in comparison with face-to-face settings (e.g. with respect to representation and interaction through body language) and only allows for what might be perceived as 'reduced acts', it also provides new possibilities and opens up the field of language learning. Some researchers in communication and semiotics therefore argue that "the medium of communication does not appear to impair interaction, but rather seems to create a new environment with different features for the exchange and creation of information" (Salaberry, 2000, p. 33). The materiality of the representational resources offers us new possibilities which in agreement with Kress (2003) we see as a challenge rather than a limitation: "I have to use the possibilities given to me by a mode of representation to make my meaning" (p. 2).

The next section is concerned with the practical implications that the features of multimodal networked environments discussed here have for language learning and teaching. After looking at some of the demands made on learners and tutors we explore how they can be assisted in making meaning in virtual multimodal contexts, using the full range of modes available in order to contribute to a gradual increase in their multimodal communicative competence and thus their literacy skills.

Learning languages with Lyceum

Background: language learning at The Open University

Lyceum, the CMC environment at the centre of the second part of this article, is an Internet-based audio-graphic conferencing system developed in the late 1990s by the Knowledge Media Institute at the Open University. It is used in the Department of Languages to deliver online tutorials and to enable students to work collaboratively in their own time. The Open University is the UK's largest provider of modern foreign languages catering for approx. 7000 distance learners of Spanish, French and German. Over 80% of our learners have access to a computer. The average student age on our Beginners' language courses is 39, with continuing language learners being on average 44 years old.

The introduction of online tutorials happened in line with the university's decision to offer baseline IT provision for all students by 2002, and to make student access to IT

compulsory by 2005. The idea was that tools for creativity and production should be made available to learners and that greater access to ICT would also allow those responsible for the development of learning material "to select from a wider range of learning activities which offer more active, student-directed learning". This, in turn, would result in "greater emphasis on project work, creative production, and student-directed research using online e-resources." (Open University, 2000).

Participation in tutorials – up to 21 hours per academic year – is not compulsory and learners can complete a language course without ever taking part in any scheduled sessions. Yet students who do attend consider the tutorials to be an essential part of their learning and as crucial for developing confidence and fluency (see Hauck & Hurd, 2005). For the past years, learners have been able to choose between a course strand with face-to-face tutorials in one of the university's 13 regional centres or tuition via *Lyceum*.

Lyceum: a multimodal networked environment

In order to take part in a conference in the *Lyceum* environment, all participants need to have a PC with a modem to connect to the Internet and a headset with microphone. The system facilitates bi- and multidirectional communication, and learners and tutors can work together in real time communicating both through audio-conferencing and tools for the exchange of graphical and textual data. These include:

- Concept map: developed for concept mapping but also useful for taking notes, brainstorming ideas or displaying information;
- Whiteboard: for writing and drawing and for importing and manipulating Web images;
- Text chat: providing limited space for additional synchronous textual input;
- Shared document: for collaborative writing, discussing and editing longer texts.

Lyceum does not offer video or webcam facility but a number of tools can be used to compensate for the lack of body language (e.g., yes/no buttons, loudspeaker icon to indicate who is speaking, list of participants' names)

In this integrated virtual environment online language learners have a variety of choices. The different tools and the modes available can be used depending on their adequacy to convey a certain message (e.g. the *shared document* to design written texts in the target language, or audio for discussions). They can also be selected to fit the learners' modal preferences or sensory style(s) (e.g. the *whiteboard* for visual learners, the *voice facility* for auditory types). Drawing on all available resources, learners can "choose the most apt forms […] for the representation of [their] meanings" (Kress, 2000a, p. 155). They can create and modify their input and combine modes (e.g. when using the *whiteboard* they can draw, import and edit images and accompany these by chunks of text). Their representations therefore tend to have a more preliminary and provisional character than more traditional written output in a face-to-face language class. This illustrates the range of possibilities for the remaking of resources offered by the new media and confirms the observations above about authorship, stability and authenticity of produced texts. At the same time it underpins the aforementioned observation regarding the levelling of authority.

A conferencing system such as *Lyceum* can be seen as a "packaged resource kit" (Kress, 1998, p. 65) within which language learners act as agents or designers, carrying out the constant transformation of resources depending on the personal, social, cognitive and affective needs and interests. The learning process itself can be characterised as a process of design, in which the degree of multimodal communicative competence and the degree of learner control are likely to be interdependent. Kress (2000c) characterises this interrelationship as follows:

> […] the work of design: the intentional deployment of resources in specific configurations to implement the purpose of the designers. […T]he work of the text maker is taken as transformative of the resources and of the maker of the text. It gives agency of a real kind to the text maker. (p. 340)

Operating in multimodal learning environments can therefore potentially contribute to an increase in learner autonomy as defined by Palfreyman (2003), that is, "the informed use of a range of interacting resources" (n.p.). However, in order to develop such autonomy and multimodal communicative competence, learners face a variety of demands.

New demands on tutors and learners

If we want tutors and learners to operate successfully in environments such as *Lyceum*, a number of challenges need to be addressed. The most striking issues are the relevance of synaesthesia, critical use of modes, affective demands, and awareness of intercultural differences.

Relevance of synaesthesia

The human potential to make and represent meaning using more than one sense at a time, that is, the transduction of meaning from one semiotic mode to another, is crucial for language acquisition in multimodal virtual learning spaces. The interaction of different modes offering different possibilities of expression makes new cognitive demands on learners who need to be able to make full use of the required senses beyond their individual modal preferences. Learners in general and language learners in particular have always been required to shift semiotic material outside their modal 'comfort zone' and to transpose information from oral input, written text and visual clues. However, the varying degrees of embeddedness of modes in the new media and the resulting modal complexity turn language acquisition in virtual environments into a new challenge. Consider, for example, text chat by itself and text chat embedded within a more complex conferencing system such as *Lyceum*. Our experience shows that in the latter case students tend to use this mode of communication to express in writing what they see on the *whiteboard* or to comment on the oral discussion. At the same time they may also communicate their individual interpretations of what is happening in an online session in more general terms. On those occasions they often engage in so-called meta-talk which can result in getting side-tracked into exchanges on issues only marginally related to the actual content of a session. It therefore becomes increasingly important for users of the new electronic media in general and for language learners in particular to be 'synaesthetically empowered' and to be trained in the constant

simultaneous use of two or more modes for making meaning. It is an activity which is constantly performed by the brain and which allows skilled users of new electronic media to simultaneously process vast amounts of multimodal information on the Internet.

Critical use of modes

In addition to the regularities – the grammar – of spoken and written language, learners in integrated online environments have to familiarise themselves with the 'grammar' of other modes such as the visual. In order to make meaning according to their interests and to engage in the remaking of resources and the design process, language learners will have to become competent in both switching linguistic codes *and* switching semiotic modes and to do so consciously. On top of that they have to become 'fluent' in new codes such as online speech and writing *and* image. Stein (2004) points out that "the theory of multimodal communication marks a paradigm shift in language pedagogy from language to mode, to exploring what modes are and how they can be used to maximize learning" (p. 105). Like Kress and other researchers interested in multimodality, she concludes that the making of meaning involves the use of several semiotic modes each with its own grammar.

Modes carry memory, history and affect (Stein, 2004). Thus a negative association, for example, with writing through the medium of a computer will influence how language learners will engage with this mode. Their degree of familiarity with the conventions and the constraints of the modes available in a networked environment are in turn likely to have an impact on their "producerly pleasure", a concept introduced by Meskill (2003) to describe the "creative enterprise of co-writing and co-constructing meaning." She contends that users 'read' electronic texts in a producerly, multimodal way comparable to Barthes' writerly readings where pleasure is experienced due to the reader's intimate familiarity with convention (Barthes, 1975, 1989). Similarly, Meskill (2003) concludes:

> Electronic texts are inherently producerly due to our extensive experiences with and facility with their convention. Moreover, the socio-emotive responses to screens […] support the notion that these encounters are inherently pleasurable, just as writerly readings are to those reading print. (n.p.)

Affective demands

Considering that not all language learners are familiar with the conventions of virtual multimodal learning environments, the new media are likely to pose affective challenges. These include issues related to varying degrees of motivation (or even lack of motivation) and computer or language anxiety.

Researchers found that the stronger the learners' self-efficacy beliefs, the more challenging their learning goals will be and the more determined they will be to overcome obstacles in the learning process (Zimmermann & Bandura, 1994). This is particularly relevant in multimodal language learning spaces such as *Lyceum* which make both linguistic and technical demands on learners. Their self-efficacy and achievement beliefs have a direct influence on their choice of learning goals. What they believe about their effectiveness as learners and whether they believe that they can master certain skills – like those characterizing new

literacies – or a specific subject such as a foreign language is believed to have a direct influence on their choice of learning goals (Hauck, 2005).

Awareness of intercultural differences

Finally, the learners' success will also depend on their level of intercultural awareness. Modes, making meaning and communicating are influenced by cultural conventions. With regard to the visual mode, Kress (1998) concludes:

> *Global communication which relies on the visual may seem to offer a means of avoiding these problems [cultural imperialism]; paradoxically, they are at least as significant, though neither understood nor acknowledged – the visual apparently offering neutral means of communicating. The visual is, however, as much formed by differences of culture as the verbal is. (p. 57)*

Meeting the challenge

Language learners in general and those operating in multimodal virtual environments in particular cannot be expected to deal with these demands by themselves but have to be supported by task designers and tutors. Learning style theorists (quoted in Klein, 2003) such as Barbe and Milone (1980, 1981), Jenkins (1988), Dunn and Dunn (1993), Carbo (1997), Leaver (1997) and Sarasin (1999) claim that students fall into modality types and learn best when taught through their preferred modalities. Accordingly instruction in *Lyceum* initially mirrored the so-called 'holistic lesson' where the same content was presented through several modalities. This approach seemed to be particularly well suited for teaching and learning in a multimodal virtual setting and reflects findings (Guri-Rozenblit, 1988; Mayer *et al.*, 1996; Moreno & Mayer, 1999a, 1999b; quoted in Klein, 2003) suggesting that students find it easier to understand and recall material when teaching happens via mixed representations.

   Yet our experience with this environment clearly shows that – departing from the concept of the 'holistic lesson' – such representations should not be redundant, but rather complementary. Learning benefits are greater still if the representations are mixed in terms of modalities (e.g. written and spoken) rather than within the same modality (e.g. graphic and textual). Tutors are therefore encouraged to set up activities in a variety of modes: A brief written summary in the *concept map*, additional oral explanations via the *audio conferencing facility*, and pictures or drawings displayed on the *whiteboard* both complementing and illustrating the main teaching points.

   Klein (2003) stresses that "most kinds of knowledge […] involve representations of more than one modality" (p. 48) and that "most representations […] engage many perceptual modalities" (p. 49), giving multimedia computer software as one example. Confirming this proposition as well as Kress's understanding of synaesthesia we found that learners tend to use one representational system before the others, but ultimately use all representational systems available to them. We have also seen, however, that those aware of their initial preferences can engage more easily in the remaking of resources and the design process. This has led to the development of a series of warm-up activities serving the following purposes:

- To raise learners' awareness of Lyceum's affordances and their individual modal preferences and thus contributing to the development of their multimodal communicative competence.
- To compensate for the loss of embodiment by helping learners to develop an online identity as well as getting to know each other.

There is – to the authors' knowledge – only one study which involves students learning a second language using multimedia and which reports positive effects of matching instructional modality to students' initial modal preference (Plass, Chun, Mayer, & Leutner, 1998). The participants retained more words studied in their preferred modality (or modalities) rather than in an alternative modality. Despite this evidence we agree with Klein (2003) that "representations that can be categorized as a single kind of system are less common […] than those that combine two or more such systems" (p. 66). This seems to be particularly relevant when new multimodal media are used. Learners in such environments constantly have to deal with narrative texts accompanied by images or audio, prose texts with illustrations, images with audio, etc. with one being embedded in the other(s) to varying degrees.

Thus, when designing tasks for language learning in environments such as *Lyceum*, tutors need to take the right modality mix into account as well as the affordances of the different modes at their disposition, that is, their specific potentials for representation and making meaning, and their limitations. Taking a role play activity as an example, this has the following implications:

- Photos can be displayed on the whiteboard for illustration purposes. But this particular visual mode only affords a limited amount of narrative content.
- Written text can therefore be used to complement the visual input providing background information and relevant data in the shared document as well as briefs outlining the arguments to be represented by the participants in the concept map. In contrast to the spatiality of the visual mode, however, the linearity of the written mode requires learners to read which can be more time-consuming.

The activities encourage participants to shift semiotic material from the written and visual mode to the spoken mode to engage in oral discussions via *Lyceum's* audio-conferencing system. The learners' performance – or, to use Meskill's words, their producerly pleasure – on such tasks will depend on their familiarity with the relevant representations. This suggests that learning to create and interpret representations, that is, to make meaning using a variety of modes – text, graphics and audio – in an environment such as *Lyceum* and to deal successfully with the resulting simultaneity of several meaning making processes should be a learning objective in its own right.

Tutors will also need to be trained in the design of activities that make efficient use of multiple modalities to ensure that learners stretch, change, adapt and modify all elements available. In doing so they will gradually turn into skilled 'semantic traders' – experienced in the realisation of the affordances of a variety of modes – and thus systematically develop their electronic literacy skills.

Preliminary conclusions

In this article we have looked at a new theoretical approach to CMC-based language teaching and learning using principles of multimodal communication in order to explore how

meaning is made in virtual learning spaces such as Internet-based audio-graphic conferencing. Our experience with *Lyceum* confirms Meskill's (1999) observation that "the engagement of multiple modalities (sight, sound, tactile, aural) is […] a highly positive contributing factor for the language learning process" (p. 145), particularly in distance education, and that the new technologies can, in contrast to Cook's (2003) more critical stance, offer this kind of engagement. Our considerations also confirm Kress's (1998) claim that "multimedia production requires high levels of multi-modal competence" (p. 65). At the same time we acknowledge that competence in all modes of representation cannot simply be assumed. Moreover – just as in face-to-face learning environments – availability and dominance of modes varies from one virtual setting to the next. This has far-reaching implications which Kress (2000b) summarises as follows:

> *The selection and concentration by a culture on one or several modes […] opens up and facilitates my bodily engagement with the world in these specific ways. At the same time it closes off, or makes more difficult, an engagement with the world in other ways. […] Assuming that we, as biological and physiological beings, are not all equally disposed to the forms most developed and valued by our culture, some members of one culture will be less well served than others. (p. 187)*

The cultural determination of modal preferences can also be extended to language learning in online environments. Thus, assuming that language learners are not equally disposed to the forms most developed in a certain online environment, some learners will be less well served than others or – in extreme cases – even find themselves excluded from the learning process. Other learners will be cognitively and affectively at an advantage over those whose initial modal preferences are not – or at least not immediately – catered for. This is made worse still by the aforementioned lack of cultural shaping with regard to the modes that the new media afford and the 'trial and error' approach which still prevails in many online classrooms.

Exploring the differences between face-to-face tuition and online interaction, Kötter (1999) identified "the reduced amount of context cues" learners receive and argues that "online environments will never accommodate the needs of each individual learner and that students using this kind of provision simply have to adapt to the specifics of its nature" (p. 339). However, this applies to any kind of setting, not just virtual learning spaces. It also underpins Salaberry's afore-mentioned observation that new environments simply offer different features for interaction and Kress's (2003) conclusion that this constitutes a challenge rather than a limitation.

These considerations illustrate the need to review our approach to language learning and teaching. It is not sufficient to equip learners with creative and democratic representational resources and expect that as a result student control over the learning process increases. Rather than continuing with the more instructivist approach used in many educational institutions and in line with Stein's (2000) call for 'multimodal pedagogies', we have to promote the kind of literacy required to use the new democratic learning spaces to their best effect, empowering learners "to choose the appropriate language for what they need to create or express; […] to enable students to communicate in the language of the twenty-first century" (Lessig, 2004, p. 38). Only then can learners construct their own knowledge, become authors and disseminate their own productions. CMC can help students in this 're-sourcing

of resources', allowing them to act ''as remakers and transformers of the representational resources available to them.'' (Stein, 2000, p. 336). This has significant implications for the way we teach and affects areas such as task design (see, e.g., Hampel, 2006), assessment and tutor training (see, e.g., Hampel and Stickler, 2005).

As we are witnessing the 'third wave of computing', mobile, wearable, and pervasive technologies offer communication environments including audio, video and 3D graphics allowing users and thus also language students to integrate CMC into the flow of their eveyday activities. It therefore becomes increasingly important to use virtual learning spaces in a way that gives students control of meaning-making and enables them to cope successfully with the challenge of their communication and interaction being doubly mediated both by the foreign language and the learning context.

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