Schmidt, Colin T. A.
(Laval Technological Institute, Le mans University, France)

Future Human Intellect. Speculations on the Future Nature of Knowledge Transfer

True *communication* between scientific communities is just as hard a case to handle as that of the translator who lunges forth into the jungle to find a community speaking a language until then unknown. The author fears those working on the devices used to render information accessible to learners will not be prepared for the change that is about to happen. Merging technologies that span Information Science, vast pedagogical resources, Advanced Networking Systems, the Artificial Sciences, Biology and Embodiment are coming to change the face of learning to a point that "normal" teaching will disappear. The banishing of current presuppositions calls for the revision of hypotheses, methodologies and validation procedures. The crucial thing for the moment is to fathom the phenomenon. The author will use a Philosophy of Language approach to enquire into options available to the research community as well as to the pedagogical resource design community.

1. Assumptions and Paradigmatic Logic

Some are starting to think a lot about the different paradigms Computer Assisted Learning and Teaching applications have been through over the last thirty years[i]. Currently, I feel it is also important to think through the rather more original ways in which people and machines *could* be combined in communicative contexts for learning. For example, one idea that has caught my eye is the immediate necessity to perform "usability testing" on systems *before* they exist. How may one do this? How might we go about finding out how to do so? These questions do seem rather difficult to deal with, but the idea is not actually "crazy" at all as one of the most troublesome things to do in devising a complex computer-based application is predicting what the user will do with it. Designing

systems using an *spiral* or *iterative approach* has become the most viable way to go about building almost all sorts of systems. Users are consulted in the process; we do this in order to reduce the amount of time and effort wasted in correcting design errors. For example in my work on how student/parent/teacher may trace past and future scholastic activities[ii], I integrate the actual final users of the socio-technical object I am assessing in the evaluation *and validation* process. This said, redesigning each step of the way may also represent a lot of time and energy.

Sound predictions are what is needed. In order to attempt to predict —conceptually— what the user may do with the final product of a design, one has to be willing to take some chances. This means that the usability expert would have to, momentarily at least, abandon the experimental setting to use a purely self-validated rational approach. I admit this approach is probably totally unacceptable when one *can* consult a set of future users on a prototypical version of the implementation. But what can one do if there are no typical users?

I think that usability studies will have to start making room for conceptual prediction as the until-now-reliable cause-effect analysis approach is encountering difficulties[iii] and many technologies are being merged with little notice. Perhaps there will no longer be typical users or uses? Sitting down and just thinking about a user with a task in a particular context will have to increasingly become accepted as *the* approach, especially when designers are faced with new situations (i.e. never having seen this *type* of situation before). In the rest of this paper, I will explore one such context without wishing to validate our 'strange philosophical suggestion' but just to try and apprehend the speed of a (possible?) transformation lurking on the horizon for the Learning Technology field, as well as the type of questions it *would* bring home for usability experts, software designers and Human Factors engineers engaged in pedagogically utilisable innovation. So I do not mean to suggest that it *will* happen, but simply that scientists should be ready for change (i.e. drop obsolete approaches and questions)[iv]. Simply apprehending it justifies our speculation.

2. The Classroom: Facts, Questions and Gasps

Humanoid robots will be massively installed in our world in the next few years (*cf*. UNECE Press Releases, Oct. 2004 et Feb. 2005). *What if humanoid robots could one day soon teach us grammar or calculus?* Specialists in cognitive robotics build humanoid robots in order to learn about human beings. Perhaps one day a humanoid could come into our home or classroom and teach us just as if it/he/she were a human, that is, using the human conviction, natural language (synthesis, recognition), gestures, persona and rigour of a very good schoolteacher from the olden days, wouldn't that be nice? This last question, if taken up in a totally utopian way is neither here nor there; the response of interest to us would come of a methodology built to confirm or reject the social acceptance of such a "product". It would seem that if we esteem it is necessary to perform usability testing on *this* system *before* it exists, we will have to hurry, especially given the current rate of technological mergers and installations.

One operation that must be performed in this area of study is to draw closer to studies in (user) intentionality (thus away from causality) in order to correctly apprehend the social dimension of cognition at play in applications like that of our electronic schoolbag; such an application sees the merger of individual activities to create communitarian awareness of the school's activities to be a paramount issue —just as would do that traditional schoolteacher. Converging upon like ideas and on, for example, the work accomplished by the student implies having a same referent or set of referents for the entire community to refer to. A good schoolteacher is anchorman with respect to information, and presents different points of view of a same problem. Unpretentiously, this is what our schoolbag tool aims at embodying in an ever so prototypical manner. However, "change is in the air" as some say, and in speculating, I accept the eventuality of our product being 'gulped up' into a larger integrative process. The building of advanced tools for learner information management and the testing of the logic put forth above needs to be driven by some strong force: it goes without saying that the philosophical notion I wish to explore here is that of *Reference*. The problem is that in the non-philosophical fields of study that usually 'handle' defining these such computer-based tools lack focus when it comes to the study of reference, notion that implicitly remains dear to schoolteacher model we offer.

3. Referential Discourse: Assumption-dropping and Projective Planning?

I do not only mean to speculate. Ethics has been concerned about the distance created by the many web pages interposed between learners and the personnel representing their teaching institutions. Much of the work in studying needs is focused on the "absence-of-people-in-the-system hang up". Ethics in teaching needs to *refer* to the future. Inasmuch as one accepts this idea, teaching Ethics should develop its own prospective dimension to help avoid coming up against the situations it would, later, have to attempt to "influence".

Humanoid innovation in the classroom could very well be just around the corner.

More generally, I find that the overall body of literature that takes computation proper and people's concerns about it as its pivotal point really does rely either on an Artificial Intelligence (AI) perspective *or* a societal one. Rarely is the pivotal point a just one. The apparent lack of reference at this level could of course hinder progress when it comes to the design issues mentioned above. Finding a *common language* between scientific fields is important inasmuch as remaining in the *speculative mode* of thinking is harmful to *scientific* and *technological* progress. My goal is thus to concentrate on integrating the study of dialogism into the field of Learning Technology. The reason is that this latter is estranged to the thought dialogism is able to explicate, that of the *logic of the relation*, ever so important to understand for creating the community feeling we are after. Russell, Jacques and yet other philosophers, studied the *notion* of relation in its own right. More specifically, the compelling opposition/attraction between Technological Cognition and Cognitive Technology (TC/CT) evoked by Gorayska & Marsh[v] constituted the enunciation of an example aimed at people working in computer-related fields who might gain insight from studying the relation in a similar way. In my mind, the idea is to *avoid* delving into the technicalities of any single (ephemeral) design, act which does limit the (referential) extensions of any creative language.

The marketplace can have a large say in what systems institutions finally invest in. So if it is difficult to inject the (expensive) human back into the teaching-learning equation and the administrator is

distant to the essential issues in knowledge transfer as well as our will for tomorrow's society —physical presence, sociability, civility, etc.—, he may opt for the wrong system. One man-centric response to the thought of humanoid robots bursting into the classroom to take the seats of our good ol' schoolteachers is to say that *1/*"the current needs expressed by pedagogues do not warrant building machines up to give them the same status as the (human) user in the system". Or *2/*"an enormous gap still exists between innovative progress and actually having the technology". I would respond to these by asking a question: *3/*"what if we *already had* the technology, that is *humanoid academics* geared up and on the rev ready to meet our students? Would we hold them back? The students I mean, I am sure they would love to try them out right away".

People working in Humanoid Robotics/Artificial Intelligence *would* give this scenario a go; now what about those working on tele-learning devices or Distance Education policies? I know, this kind of takes the dimension of distance out of it (we could send humanoids out into remote areas, rude climate zones and so forth), but putting programme and policy writers before the situation expressed in *3* — in which responses *1* and *2* above are refuted outright— is the only way to bring them around to speaking the language of those working in AI since the 40s. I say this as my informed hunch is that these two communities (HR/AI and Educational Technology) would not see eye-to-eye. Any bi-polarised discussion would gives rise to a deep-seated indetermination for it is impossible to generate the *qualia* of a system of thought with the elements of another—in other words, to simulate for oneself what the Other feels[vi].

*

* *

In my past work, I have discussed the problem of *Radical Translation* that exists between various cognitive systems (person-person and person-machine); in the present work, I take this discourse to the level of scientific communities and —through a referential approach— endeavour to implicate political stances and concepts that could be brought to bare on the subject.

References

BROOKS R. (2002), *Robot: The Future of Flesh and Machines*, London: The Penguin Press.
DENNETT D. (1987), *The Intentional Stance,* Cambridge MA: Bradford/The MIT Press.
GOCHET P. & GRIBOMONT P. (1990/91) *Logique. Méthodes pour l'informatique fondamentale,* Paris : Hermès.
GOCHET P. & GRIBOMONT P. (1994) *Logique. Méthodes formelles pour l'étude des programmes,* Paris : Hermès.
JACQUES F. (1976), "A Terminological Note about Reference", RYLE G., *Contemporary Aspects of Philosophy*, London: Oriel Press.
HABERMAS, J., 1973. *La technique et la science comme ideologie,* Gallimard. [Techniks und Wissenschaft als Ideologie].
LAUDAN L. (1977), *Progress and Its Problems: Towards a Theory of Scientific Growth*, Los Angeles: University of California Press, as well as others in the Philosophy of Science.
MAGNANI L. (ed.), *Computing and Philosophy*, Associated International Academic Publishers, Pavia Italy.
PUTNAM H. (1975). *Mind, Language and Reality*, vol. 2, Cambridge MA: Cambridge University Press.
QUINE, W. V. O., (1960). *Word and Object,* Cambridge, MA: The MIT Press.
SCHMIDT C.T.A. (Forthcoming), Pieter E. VERMAAS, Peter KROES, Andrew LIGHT, Steven A. MOORE, *A Survey of Contemporary Philosophical and Ethical Work on Artefact Design and Design Processes*, Springer.
SCHMIDT C.T.A. & KRAEMER F. (2006), "Robots, Dennett and the Autonomous. A Terminological Investigation", *Minds and Machines. Journal for Artificial Intelligence, Philosophy and Cognitive Science*, Vol. 20 N° 1, Kluwer/Springer.
SCHMIDT C.T.A. (ed.) (2006), *"Collaborative Distance Activities: From Social Cognition to Electronic Togetherness", Special Issue of AI & Society. The Journal of Human-Centred Systems and Machine Intelligence*, Springer, issn 0951-5666.
SCHMIDT C.T.A. (2004), "A Relational Stance in the Philosophy of Artificial Intelligence", *European Conference on Computing and Philosophy,* E-CAP 2004, 3-5 June, University of Pavia, Italy.
SCHMIDT C.T.A. (2005), "A Topical Note on Accessing Scientific Refinement", *Journal of Cognition and Culture*, Kluwer.

SCHMIDT C.T.A. (2005), "Robots, IPR and Us", Invited by the Society for the Philosophy of Technology (SPT), *The 102nd Annual Meeting of the American Philosophical Association*, 27-30 April, Chicago Illinois.
STRAWSON P. (1950), "On Referring", *Mind*, vol. LIX n°235.
THAGARD, P (1993) *Computational Philosophy*, The MIT Press.
WITTGENSTEIN L. (1953). *Philosophical Investigations*, Oxford: Blackwell.
ZLATEV J. (2001), "The Epigenesis of Meaning in Human Beings, and Possibly in Robots", *Minds and Machines* n° 11, Kluwer, p. 155-195.

ENDNOTES

[i] *Cf.* SCHMIDT C.T., COTTIER P. & CHOQUET C. (2004), "Learning with the Artificial Sciences: A Paradigmatic Shift", *In* the "Transitions Session" of the IFIP Conference on the 'History of Computing in Education' TC3 WG 9.7, 22-27 August, Toulouse (France), *Proceedings of the 18th World Congress on Computing (WCC-2004 HCE)*, Kluwer Academic Publishers, p. 35-46.

[ii] A very short definition of an electronic schoolbag resource will be given here.

[iii] *Cf.* COTTIER P. & SCHMIDT C.T. (2005), "Le dialogue en contexte : pour une approche dialogique des environnements d'apprentissage collectif". *Revue d'intelligence artificielle*, Hermès-Lavoisier.

[iv]Read Laudan on competing theories, *cf.* LAUDAN L. (1977), *Progress and Its Problems: Towards a Theory of Scientific Growth*, Los Angeles: University of California Press, as well as others in the Philosophy of Science.

[v]*Cf.* GORAYSKA, B. & MARSH, J., (1996). "Epistemic Technology and Relevance Analysis: Rethinking Cognitive Technology", *in* GORAYSKA, B. & MEY, J., *Cognitive Technology: In Search of a Humane Interface*.

[vi]*Cf.* the second chapter "Translation and Meaning" of the classic, QUINE, W. V. O., (1960), *Word & Object*. *Cf.* also SCHMIDT C.T.A. (2004), "Humanoids, from Interfaces to Intelligence. Really? A Philosophical Statement on Retrograding or Scientists Caught Back-peddling", *The 2004 American Association of Artificial Intelligence Fall Symposium Series* on 'The Intersection of Cognitive Science and Robotics: From Interfaces to Intelligence', October 22-24,

Washington D.C. USA, *Technical Report N° FSS-04*, Menlo Park CA: The AAAI Press pp. 55-60.