

## DISCUSSION

The discussion was opened and guided by the following questions:

- How can we link our theories to the mathematical background? Is this necessary?
- Why should we care about theories as an object of research? Working with theories and constructing theories within mathematics education is our job. It is not our job to investigate the epistemological processes within ME themselves. We have enough problems to work on if we restrict ourselves to the teaching and learning of mathematics.
- What does consistency mean? Taking bits and pieces from different theories includes the danger to merge inconsistent parts. Does consistency depend on the grain size? How can we link different grain sizes?

The following comments, relating to the above questions, were made by members of the audience and the presenters:

Concerning the link to mathematics, on the one hand, the experience of participants in the *Advanced Mathematical Thinking* group of CERME is that linking the theories to mathematical content domains is crucial, especially crucial when trying to network with mathematicians. On the other hand, most mathematicians hesitate to go into didactical theories, and those who do sometimes point out difficulties of communication (Quinn, 2008).

Concerning the importance of reflecting at the meta-level how we work with more than one theory, other working groups than those mentioned above also reported that they were coming up against this issue; specifically, the working groups on *Affect*, on *Mathematics and Language*, on *Early Years Mathematics*, and on *Comparative Studies* were mentioned. In addition, two comments were made, namely that networking will never end since theories are dynamic entities, and that the important aspect of John Monaghan's presentation is the human one, never mind whether individual or social. However, the characteristic trait of this part of the discussion was that contributors tended to ask questions rather than make comments; these questions included:

- Isn't our research necessarily linked to what happens outside of the discipline since the research needs are defined by politicians, funding agencies, and teachers?
- How do we deal with theories that we adopt from other disciplines such as psychology, epistemology, or even medical science? In particular, how do we integrate mathematics (or at least a mathematical view) into these theories? How do we integrate theories from other disciplines into the area of mathematics education?

- To what extent do home-grown theories integrate, adopt or adapt elements from general (outside) theories?
- How would one distinguish local from global combining of theories?
- Shouldn't networking efforts also include cases where the researchers attempting to connect do not start from a specific phenomenon?
- Why not using the useful (but relative) distinction between background and foreground theories?
- Would it promote networking to start by comparing metaphors?

Concerning the issue of consistency, participants commented that criteria for consistency might better be found outside our community, that it might be preferable to use the term 'compatibility' rather than 'consistency', that the distinction between 'theories of' and 'theories for' could be useful, that looking at complementary phenomena could be a starting point for networking theories – a point already made by Steiner (1985), and that the main reason for connecting theories might be the complementarity of their aims, which is important by itself and might make their convergence rather less important.

While it is far from clear whether our community has already made substantial progress in its attempts to find ways of working with different theories in mathematics education research, this plenary session has made it amply clear that the issue of how to work with different theories is deep, that it occupies a central position for a large number of researchers and plays an important role in the discussions of a majority of the CERME working groups. It is therefore recommended that CERME continue its support of efforts to make progress on this issue and to discuss scientific ways of dealing with the diversity of theories in a manner that is comprehensive and includes researchers from different areas and backgrounds within mathematics education.

Quinn, F. (2008). Communication between the mathematics and mathematics education communities. Retrieved April 27, 2009 from <http://www.math.vt.edu/people/quinn/education/communication.pdf>

Steiner, H.-G. (1985). Theory of Mathematics Education (TME): an Introduction. For the Learning of Mathematics 5 (2), 11-17.