

FOLLOWING ABSTRACTION THROUGH TRACES OF MATHEMATICAL ACTIVITY

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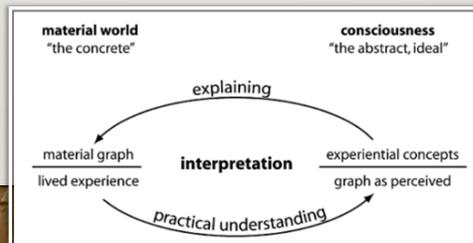
MATERIALITY AND MATHEMATICAL ACTIVITY

- **What is “material”?**
 - **Body**
 - **Manipulative**
 - **Tools, including digital technologies**
 - **Language**
 - **“Language is infused with materiality and should therefore not be considered as an abstract system that is isolated from socio-material reality” (Gahrn-Andersen)**

Spoken sounds and written words and symbols are the material sign is “semiotic conflation and co-habitation through matter that enacts and brings forth the world” (Malafouris)

ABSTRACT|CONCRETE

- Our symposium: Learning from the "more-than" of mathematical abstraction
- “abstraction is a ‘lie’” (Díaz-Rojas, Soto-Andrade, and Videla-Reyes 2021)
- Accounts of a “double ascension that simultaneously moves from concrete to abstract or from abstract to concrete” (Roth & Hwang)



TRACES, PRESENCE AND ABSENCE

- Traces : a dialectical opposition of absence and presence (Derrida 1982)
 - The presence of something absent, the absence of something present
- What is perceptually present and present as absent, and the actual work of bringing forth (Noë 2012)
- ... a focus on *Doing*: **observing how traces (presence|absence) stimulate mathematical activity**
 - “double ascension”: making the abstract more abstract and the concrete more concrete, while developing familiarity

Including speech and writing particularly

$$\frac{18}{64} = \frac{1}{4}$$

This is not mathematics

FRAGMENT FROM A CLASSROOM LESSON

Teacher: Here I have sixteen over sixty-four, and I found that when I cross out the six's I get one fourth. Does this method work? Yes? Why?

Student: Because you do four times six, it gives you sixty-four. If you do times six you get the same response.

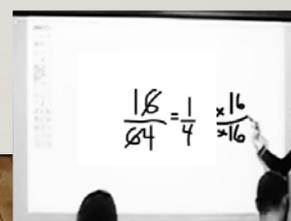
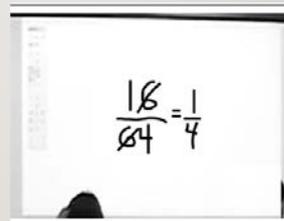
T: Ok, if you do 1 times...

S: Euh no times 16

T: Ok ok I'm happy with this. 'Cause if you do time 16 on top and on the bottom we will get 16/64.

S: ok then 16/64 is equal to 1/4

T: Equals 1/4, that's it [...]



A FEW REFERENCES

- Díaz-Rojas Soto-Andrade and Videla-Reyes (2021)
- Roth, WM & Hwang, SW (2006). Does mathematical learning occur in going from concrete to abstract or in going from abstract to concrete? *Journal of Mathematical Behavior*, 25, 334–344
- Noë, A. (2012). *Varieties of presence*. Harvard University Press.
- Gahrn-Andersen, R. (2019). But language too is material!. *Phenomenology and the cognitive sciences*, 18(1), 169-183.
- Malafouris, L. (2013). *How things shape the mind: A theory of material engagement*. Cambridge: MIT Press.
- Maheux, J.F. (2021). *Traces: doing mathematics, and the mathematics that is done to us*. Proceedings of the MES conference.