

The paradox of un/making science people: practicing ethico-political hesitations in science education

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Abstract Over the years neoliberal ideology and discourse have become intricately connected to making science people. Science educators work within a complicated paradox where they are obligated to meet neoliberal demands that reinscribe dominant, hegemonic assumptions for producing a scientific workforce. Whether it is the discourse of school science, processes of being a scientist, or definitions of science particular subjects are made intelligible as others are made unintelligible. This paper resides within the messy entanglements of feminist poststructural and new materialist perspectives to provoke spaces where science educators might enact ethicopolitical hesitations. By turning to and living in theory, the un/making of certain kinds of science people reveals material effects and affects. Practicing ethicopolitical hesitations prompt science educators to consider beginning their work from ontological assumptions that begin with abundance rather than lack.

Keywords Subjectivity · Science education · Science identity · Neoliberalism · Ontology

As a science teacher educator, I constantly question my complex position of preparing future science teachers to essentially create a particular kind of ‘successful’ science student. Shelley (this issue) Stromholt and Philip Bell’s paper amplified my hesitation to consider the ethicopolitical commitments embedded in science education’s inherent

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This review essay addresses issues raised in Shelley Stromholt and Philip Bell’s paper entitled: Designing for expansive science learning and identification across settings, <https://doi.org/10.1007/s11422-017-9813-5>.

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obligation to ‘make science people’. More specifically, I use this Forum response as space to critically examine human and non-human intra-actions shaping the role and work of science educators in a deep-rooted neoliberal context. Throughout the piece, the entanglements of ‘making science people’ and neoliberalism materialize.

To do so, it is imperative that *we/I* (i.e., myself, readers, and science educators) (re)engage theory as a living phenomenon. By what I refer to as ‘*living theory*’, science educators (in all capacities) might be enabled to visualize, feel, and question the ethicopolitical implications and hesitations lurking at every turn. Science educators and researchers of science education might consider turning to theory as an act of social justice, but more broadly conduct research as a form of social justice (Wallace in press). Whether it is the provocation of an idea or attending to an implicated subject (e.g. researcher and participant) theorizing opens-up the possibility to *do something* (Strom and Martin 2013, emphasis added). With this in mind, each of the major section headings framing this Forum response are not merely representative of the content discussed, but they also symbolize ways meaning (and in/action) might stay on the move (Jackson and Mazzei 2012). By intentionally emphasizing ideas as a verb (e.g. turning, examining, un/making, practicing, re-conceptualizing, acting, and thinking) I hope to begin illuminating ways our work within science education always-already *does something*. Each decision, desire, and idea have material outcomes on (and within) the lives of others. In turning to theory, processes of un/making ‘science people’ trigger reverberating opportunities where science educators might act and think Slowly (Ulmer 2016, capitalization emphasis original).

Turning to theory as a form of social justice

Influenced by a feminist poststructural (St. Pierre 2000) perspective which examines notions of subjectivity, language, power, truth, and knowledge I often see these concepts as constantly shaping science education. However, my enactment, or rather, *living of theory* is messy. This piece resides in tension (Springgay and Truman 2017) between theories of feminist poststructuralism and new material feminism. As I turn to theory to ‘tinker in tension,’ Stromholt and Bell’s piece signals me to re-engage their methodological decisions and ideals for a stable and knowable ‘science-linked’ humanist subject. Alternatively, feminist poststructuralism sees subjectivity as always already “in process” where “everything we do signifies compliance or resistance to dominant norms” (Weedon 1997, p. 83). Through ideas of ‘good,’ ‘true,’ and ‘right’ science education we begin to see how the desire to construct “science-linked identities” (Stromholt and Bell this issue) is implicated within a politics that governs a particular kind of ‘science subject.’ *Living theory*, that is, to live *in theory* and for theory to *live in science education* enables science educators and researchers to practice an ethics of hesitation (Biesta 2012) when un/making science people. By living theory, I enact a Slow ontology as a mode of being that “disrupts daily practices that prioritize speed, efficiency, and output” (Ulmer 2016, p. 2, emphasis original) otherwise. In doing so, science educators might challenge neoliberal ideology in science education through the very mode of *being- and/or becoming-‘science educators’* in which they choose to reside.

Examining neoliberalism in science education

The work of science educators and context of science education is underpinned by neoliberal ideology. As Stromholt and Bell claim, “many traditional narratives tied to science education reinforce aspects of the neoliberal project”. These ‘traditional [neoliberal] narratives’ of science education are the dominant narrative of science education, and therefore (implicitly and explicitly) reinscribe non-traditional, un-conventional, and non-normative critical voices in science education (Bazzul and Siry in press) as unintelligible or illegitimate. More specifically, Stromholt and Bell allude to the relationship between ‘traditional narratives of science education’ and positivistic science education research continuing to maintain ‘business as usual’ in science education. Whether it is reinforcing perceptions of objectivity or the role of STEM careers in the global marketplace (Benceze, Carter, Chiu, Duit, Matin, Siry, Krajcik, Shin, Choi, Lee, Kin 2012), neoliberalism percolates throughout science education. The traditional narratives that contextualize research and/or ‘best practices’ of science education “reinforce and legitimize a neoliberal hegemony of global competition and capitalist expansionism” (Weinstein, Blades, Gleason 2016, p. 201). In this way, neoliberalism is the big elephant in the science education room (Carter 2014).

With pressure and expectation to properly create ‘scientific people’ for the global marketplace, science education is situated in prime position for science educators and researchers to reinscribe the very assumptions critics of neoliberalism seek to disrupt. Such hegemonic movements might be as simple as (implicitly and explicitly) designing a normalizing and normative role of science teachers (and their practice) to emphasize science (or STEM) careers, which emphasize profit margins over eco-social justice community-based initiatives. Regardless if the approach recenters or de-centers the science teacher in classroom instruction, the decision itself (i.e., in some mode or another) gets reinforced through measures of accountability; a hallmark signature of neoliberal ideology (Tobin 2010). A seemingly ‘basic’ claim of *ought* becomes much more complicated when re-examined through the lens of neoliberal ideology. Given that neoliberalism is heavily driven by capitalist market demands, the call for the development of human capital, that is, ‘science people’ is no less than a direct request that science educators become both instruments and objects of neoliberal control. It is within this juncture that science educators might consider residing in a state of hesitation.

Science education knowingly and unknowingly serves as a strategic apparatus to facilitate “an internationalization (or subjectification) of rationalities or ‘regimes of truth’” connected to biocapitalism (Pierce 2013, p. 13). For example, Clayton Pierce (2013) refers to the current climate of education as the *neo-Sputnik* era of school reform. Again science educators occupy a critical space between the demands for ensuring national security and global competitiveness in their very expectation to produce certain kinds (and amounts) of ‘science people’ in the current neo-Sputnik era of school science. Herein lies the complex intersection and intra-action (Barad 2007) among biocapitalism, neoliberal ideology, discourse of science education, and commodification of a neoliberal subjectivity within an array of living (and non-living) entities. In alignment with Jesse Bazzul (2012) the aforementioned intersections reiterate: “it is vital for science educators who wish to push back and problematize neoliberal ideology in educational settings to think about ideology itself, how it operates, and recruits all of us on a general level” (p. 1005).

While Stromholt and Bell begin to illuminate ways science educators might be motivated to “challenge neoliberal instantiations of standards-based” instruction (p.1) through

the coordination of science education across diverse educational settings (e.g. student homes, Superfund site, and school), the desire to construct ‘science-linked’ identities as neoliberal resistance perhaps should prompt moments of hesitation. Whether tied to the ontological and epistemological underpinnings of our work, science educators might also consider ways neoliberalism percolates throughout our often taken-for-granted assumptions of who (e.g. heterosexual white men) and how (e.g. as a means to maintain hegemonic traditions of scientific inquiry) one *ought* to become ‘scientific,’ and for what purposes. With these questions in mind, science teacher education and K-12 science education might begin from alternative assumptions that look at all individuals as always-already ‘scientific’. Then, science education might begin from a critical ethico-political engagement with definitions of ‘science,’ ‘scientist,’ ‘being scientific,’ and ‘becoming scientific’; rather than defaulting to a banking model (Freire 1970) of making ‘right’ and/or ‘true’ scientific identities that maintains prevailing structures of oppression.

Un/making science people

Given the entanglement of neoliberalism and science education, the work of science educators lives within a complicated paradox. As one educates K-12 students or teachers to acquire science-linked identities, science educators also construct a particular kind of ‘un/scientific person’ (e.g., marginalized populations who do not enact scientific inquiry and/or practice ‘as usual’). Herein lies one of the many contradictions that maintain expectations of the educative experience. Akin to James Baldwin’s description of “the crucial paradox” of education, science education was also designed “to perpetuate the aims of society” (1998, p. 678). Science and science education’s (re)production of systems of dominance: be it patriarchy, heteronormativity, white supremacy, (neo-)colonialism, ableism, classism, labor inequity, anthropocentrism, and others underpin the prevailing assumptions regarding what it means to be (and/or become) a ‘science person.’ These deeply entrenched traditions are reinforced and amplified by neoliberalism’s close relationship to science education (e.g., science curricula and teacher training sponsored and designed by oil companies). Transgressing from merely the traditions of doing, thinking, and/or speaking science, “neoliberalism also has to do with the formation of individual subjects through discourse” (Bazzul 2012, p. 1010). Whether it be the discourse of school science, becoming a scientist, or doing science, particular subjects are made intelligible, while others are made unintelligible.

Stromholt and Bell’s piece, like many others in science education, signals a desire for marginalized students to acquire and/or construct ‘science-linked identities’. In doing so Stromholt and Bell’s work initiates another critical and complicated conversation for science educators to deeply examine the ethics of desiring a ‘science-linked subject’. By turning to poststructuralist and posthumanist theories, new questions become thinkable. For example: how might such a desire and neoliberalism intersect, overlap, and even materialize within science education? As science educators, what is our ethical obligation to contemplating these inherent junctures? How might *living* theory enable science educators to examine the layers of our work through constant questioning of the underlying assumptions (and desires) for the students and teachers implicated or, in the case of Stromholt and Bell marginalized communities? Further, by *living* theory in such a way that meaning and its movements are made apparent (Jackson and Mazzei 2012), science educators might also reveal their work on (and *in*) the move. These lingering questions

frame forthcoming analyses not just as critique, but as a strategic move to follow often policed (and therefore unfollowed) lines of flight (Deleuze and Guattari 1987) in science education. In doing so, I re/turn to theory as a practice of hesitation (Biesta 2012) causing me to pause *within* the paradox of un/making science people, as both a strategic com-modification for neoliberal aims and space for critical liberatory praxis.

While there are other poststructural and posthumanist perspectives that provide many generative levers for deconstructing the complexities of science education and neoliberalism, I focus on constructs that directly attend to the re/production of subjects, and thus also subjectivity. Using Ian Hacking's conception of interactive kinds (1999) as a process of 'making up people' I explore how projects to make more 'science people' are always-already shaped by the discourse surrounding their construction. Secondly, Deleuze and Guattari's (1987) concept of facialization reveals politics framing science educators' expectation and/or desire to construct an intelligible 'science face'. The forthcoming sections work to shift from Enlightenment thought where a subject exists a priori to society toward queering ways we might conceptualize the notion of a subject in science education. From a poststructural and posthumanist perspective subjects *are made* through their inherent engagement with non-human entities (i.e., ideas, discourse, classifications, measurement).

Making kinds

How does 'making up people' take place? According to Hacking (2007), a series of engines (i.e., discovery, practice, and administration) are always followed by a resistance to their identity deemed proper by 'the knowers' when making people. Subjects get plugged into the engines that make them (e.g. counting, correlation, norming, quantification, and medicalization to name a few) and thus are made into kinds of people. Hacking uses the terminology of 'people' to speak at a species level, and thus a body or population of subjects. It could be argued that 'science people' have become a particular kind of population that embodies a heightened neoliberal subjectivity needed to maintain the re/production of *homo economicus*. According to Hacking (2006) 'kinds of people' are made in the event of the following argument:

- (A) There were no X (people) before time t : there were many after time t^* .
- (B) Before time t , X was not a way to be a person, people did not experience themselves in this way, they did not interact with their friends, their families, their employers, their counsellors, in this way; but after time t^* , this was a way to be a person, to experience oneself, to live in society.
- (C) The X person, as a kind of person, did not exist before t , but did after time t^* . (p. 17)

In the case of science education, I suggest here we think of X as 'science' and time t as neoliberalism. Now, we can re-read Hacking's argument for making up people in light of science-linked identities in a neoliberal age. Through this framework science educators can begin to see that 'becoming science-like' or 'becoming scientific' can be manufactured today in a very specific way through neoliberalism and science education. Though different social orders will have different regimes that demand various kinds of subjects, 'becoming scientific' has always been the aim of science education. We can see and feel it through state and national science standards, grant-funded research programs, employment demands, and influence of global markets on science curricula. It is very easy to say,

“Yes, okay. I’ve known this all along. Making science people is why I am a science educator”. However, what is not so easy is to regularly take care for the ethics inherent to that very imposition embedded in the expectations of being a science educator. In this way I am not referring to merely filling out an ‘ethics’ section on a grant application, but rather, as Hacking (1999) illuminates, ways we might *live* and *think* the ethics of our obligation as science educators.

The enactment of such a practice better positions science educators to see themselves and their decisions as an interactive kind (Hacking 1999). When ‘science people’ are made, they have been successfully classified. In the context of neoliberalism, science education, and other vectors of power (i.e., sexuality, ablism, race, class, indigeneity, and gender; Higgins 2017), interactive kinds maintain the classification of subjects as reflective of “value-laden kinds, things to do or not to do. Kinds of people to be or not be”. (Hacking 1999, p. 131). In science education, Modern Western Science is just one example of the ‘value-laden kinds’ often made. And remade. Neoliberalism and science education, as interactive kinds, are intricately involved in the making up of science people.

Inscription of a face

Faces are recognizable. Whether it is Deleuze, Guattari, teacher, student, scientist, or neighbor, each face is discernible. With each face also comes particular markings constructed through a black hole/white wall system of facialization (Deleuze and Guattari 1987). Regardless of species (e.g., human and/or non-human), all beings acquire faces. In fact, “since all semiotics are mixed and strata come at least in twos, it should come as no surprise that a very special mechanism is situated at their intersection. Oddly enough, it is a face” (Deleuze and Guattari 1987, p. 167). Through the diagram presented in Fig. 1, science educators can begin to see how the face of un/making science people “is redundancy” (Deleuze and Guattari 1987, p. 167). That is, the face is always made to “conform in advance to a dominant reality” (Deleuze and Guattari 1987, p. 167). Science educators cannot escape the complex paradox that has and will continue to contextualize science education’s obligation to un/making science people.

Figure 1 depicts the re/productive nature of our work as science educators. If it is science education’s obligation to create science knowers, it is also science education’s ethical obligation to hesitate to resist the potential re-inscription of particular kinds (and faces) of science knowers. At every turn, response, question, or imposition science educators also implicitly and explicitly strategically re/produce ‘unscientific people’. Consequently, “racism [and subjectification in science education] operates by the determination of degrees of deviance in relation to the White-Man face, which endeavors to integrate nonconforming traits...” (Deleuze and Guattari 1987, p. 178). The multivocal assemblage of “I, we, science educators” might consider inaction as a next step given that the reproduction of a science face embodies traces of white supremacy, classism, ableism, and sex/gender prejudices. Like Fig. 1, inaction also produces some form of action. Each binary (e.g., in/action, re/produce, un/make) contextualizing science education is intra-active (Barad 2007). Since science educators always-already live at the intersection of making and unmaking science people, “*the question then becomes what circumstances trigger the machine that produces the face and facialization*” (Deleuze and Guattari 1987, p. 170, emphasis original). What circumstances trigger the machine that produces the scientific face? In doing so, the question(s) become more complicated when science educators are reminded of their inherent position within a neoliberal context.

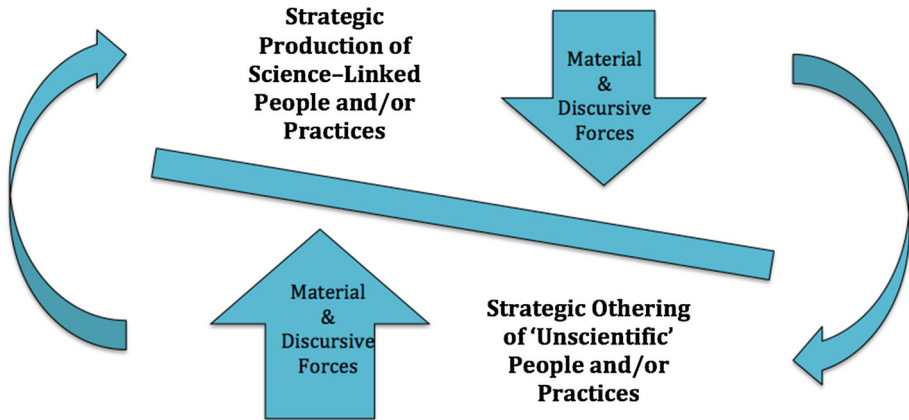


Fig. 1 Paradox of un/making scientific people and practices. Figure adapted from Wallace (2017)

Material affects and effects

The paradox of making and unmaking certain kinds of science people has material effects and affects. Be it instruments of evaluation, ideology, ideas, taken-for-granted assumptions each inscribe particular features onto practices of un/making science people. Given my position as science teacher educator and a white, able-bodied cis gender woman, I tread lightly and sometimes not at all. Personally, ‘treading lightly’ and, at times, not at all is one way I enact ethicopolitical hesitations when I work with teachers; regardless of disciplinary focus. However, given my conflicting (and at times contradictory) criticality, affinity, and affective relationship with science (Wallace 2016) I move even slower. *Living* theory helps me do this. Building on poststructural accounts of discourse, new materialist feminism (Barad 2007) serves as a staunch reminder of ways apparatuses (of all forms) illuminate matter and discourse *together*. Simply put, “ideas do not die” (Deleuze and Guattari 1987, p. 235). Ideas live on. Ideas have material outcomes. In the case of un/making ‘science-linked identities,’ the material outcome transpires on (and within) the bodies, hearts, and minds of others. The very modes of *being* are affected, while also reflecting an effect of *somebody’s* apparatus. Consequently, processes of ‘making’ are a constitutive feature of the material outputs, which inherently necessitates processes of *un*making as also another constitutive feature of apparatus de/sign (Higgins, Madden, Berard, Kothe, Nordstrom 2017). In fact, “the inhuman *in* human beings: that is what the face is from the start” (Deleuze and Guattari 1987, p. 171, emphasis added) always persists. What might become (im)possible if science educators reside within this intra-active juncture?

The 2017 CSSE Forum in San Antonio, TX initiated a conversation to begin exploring the entanglements of science education and new materialist feminism. Working with Carol Taylor (in press) it became apparent that the thoughts of Barad’s agential realism always-already shaped science education as an embodied knowing through being in relation with others (human and non-human). In the CSSE Forum space (and others) I was reminded of theory’s (and the act of theorizing) complex position of being ‘at home,’ while simultaneously distant with(in) science education. Theorizing with feminist new materialist intersections within science education “can help us ‘see’ opportunities for critical-liberatory lines of flight within science education research and practice” (Bazzul, Tolbert, and Kayumova in-press, p. 13). Whether it is conceptualizing ‘science-linked identities’ and

their construction as phenomena, making kinds, and/or a process of facialization, things happen to subjects and spaces. That is, such ‘happenings’ are productive and repressive of what (and who) might be (or become) in science education. Living theory enables science educators to feel around the junctures and ruptures intrinsic within an ethico-political obligation to un/make science people.

Practicing an ethicopolitical hesitation

Theory, not as a framework, but a way of being in and with the world enables science educators to recognize that our “eyes are useless, for they render back only the image of the known” (Deleuze and Guattari 1987, p. 171). Once science educators embrace mo(ve)ments that enable being as knowing, ‘the face’ of ‘science people’ can be dismantled and deterritorialized:

Dismantling the face is the same as breaking through the wall of the signifier and getting out of the black hole of subjectivity. Here, the program, the slogan ... is: Find your black holes and white walls, know them, know your faces; it is the only way you will be able to dismantle them and draw your lines of flight” (Deleuze and Guattari 1987, p. 188)

An ethico-political hesitation creates possibilities for lines of flight. It is a pause, or in/action, that turns to the praxis of theory and practice. Informed by Gert Biesta (2012), an ethico-political hesitation entails holding back and an awareness of entities ‘beyond’ or ‘outside’ the common. In these subtle moments minor gestures (Manning 2016) might initiate pause when crafting research questions, developing research projects goals, designing course syllabi and assignments, or reside in the joy that comes with imagining what might be. Or as Maxine Greene (1995) puts it, “a person may become freed to glimpse what might be, to form notions of what should be and what is not yet (p. 19).

Comprised of practical and theoretical pauses, an ethicopolitical hesitation is intricately tied to a commitment of *unmaking* science people that for reasons tied to the white supremacist capitalist patriarchy (hooks 1999) are deemed illegitimate. Like Deleuze and Guattari’s (1987) account of racism through facialization, neoliberalism and science education “propagates waves of sameness until those who resist identification have been wiped out” (p. 178). To be clear, ‘unmaking science people’ *does not* imply that science educators stop teaching science at any level, but rather objects processes of thinking/doing science education that reifies the same white supremacist capitalist patriarchal subjectivity percolating throughout dominant narratives of ‘good,’ ‘true,’ and ‘right’ science education. This is where we might hesitate to act and think anew. Through concepts of facialization (Deleuze and Guattari 1987) and interactive kinds (Hacking 1999) science educators can begin to feel, imagine, and re-conceptualize how the un/making of science people is deeply entrenched in the very movements and thoughts framing *the oughts* of science education.

Re-conceptualizing the discourse of science education

Discourse is not limited to the terminology in which we use to speak about science education, but “frames the very possibilities of thought and action, social relationships, subjectivity, and even the distribution of material goods” (Bazzul 2012, p. 1010). Given

the connections between language and discourse it matters how science educators talk about the subjects implicated in our work. In fact, these taken-for-granted assumptions can be further connected to neoliberalism in science education.

Regardless if we are referring to science teachers or students of science, both positions are often referred to as somebody who ought to learn. Whether it is learning more of something or learning some-thing differently, the language of *learning* begins from the assumption that some one *must lack* (Biesta 2010). If we are re-conceptualizing the discourse of science education as an ethico-political commitment to the subjects implicated, “What matters in calling someone a learner is, however, not about what it is that needs to be learned... [but that] the learner is the one who is missing something. The learner is the one who is not yet complete.” (Biesta 2010, p. 541). Science teachers and students are often expected to embrace an identity of being a ‘lifelong learner’; however, Biesta (2010) suggests that the very act of calling someone a learner is to “suggest an inequality” (p. 541). While the title of ‘learner’ is often given by somebody in power (e.g., teacher to student, researcher to participant, scientist to those not yet scientific enough), this assumption takes on a totally different form when the notion of needing to be always ‘a learner’ is embodied by subjects themselves since it continues to reinscribe a subjectivity that always-already needs capital improvements. The pressure to embody *and* embrace a neoliberal subjectivity is significantly heightened within science education. If science educators desire to enact ethico-political hesitations in their work, it is critical to attend to ways language, conceptions of truth, knowledge, matter, and perceptions of objectivity greatly shape the realities of others.

The next section provides a few entry and exit points for science educators to imagine non-normative and non-normalizing possibilities for the discourse of science education. Rather than reifying one system of inscription, identification, and/or subjectification, Table 1 outlines mo(ve)ments where science educators might enact ethicopolitical hesitations when un/making of science people.

Table 1 Overview of possible mo(ve)ments for ethicopolitical hesitations in science education

	Major language Become a scientist	Minor language Becoming-scientist
Initiating bodies	University Scientists across Disciplines (i.e., science education and STEM fields)	Local Community Members (i.e., children, families, indigenous communities, teachers, students)
Driving question	What should we do?	What and who is always-already?
Underpinning assumptions	Driven by questions of ‘ought’ (How <i>ought</i> we disseminate our knowledge?) University scientists and/or science education researchers hold the desirable knowledge to disseminate in and onto others who are not yet scientists	Driven by questions of ‘might’ (How <i>might</i> we un/learn in process with(in) communities?) University scientists and/or science education researchers view spaces and people as always-already holding scientific knowledge that further extends the scientific community

Minor mo(ve)ments in and among major forces

Making science people is often over-coded by a territorializing narrative of who and how one ought to become a scientist. As depicted in Stromholt and Bell, science educators are held accountable for the implementation of instructional projects that result in ‘science-linked’ identities. I wonder how being accountable to making science people, might necessitate an obligation to also unmake science people as an act of critical liberatory praxis.

With this in mind, Table 1 was organized in such a way that it presents two dichotomous examples of how minor and major languages (Deleuze and Guattari 1987) might be conceptualized in science education. Deleuze and Guattari (1987) explain that the concepts of “‘minor’ and ‘major’ do not qualify as two different languages but rather two usages or functions of language” (p. 104). Similar to the intra-active relationship of un/making science people, minor languages “only exist [in] relation to a major language and are also investments of that language for the purpose of making it minor” (Deleuze and Guattari 1987, p. 105). For example, the analogy below provides another image for how the production (and maintenance) of a dominant/true/right entity leads to the reproduction of an Other, through norms of Othering.

Making science people : unmaking science people :: Major languages : minor languages

Re-read alongside Table 1 major and minor languages within science education ‘make live and let die’ particular movements and possibilities for those implicated. Relying on a minor language, the practice of ethico-political hesitations in science education is to work toward a “goal [that does not] indiscriminately tear down arborescent structures,” encompassing science education, “but to see[s] them for the highly over-coded and territorialized structures they are” (Bazzul and Kayumova 2016, p. 4). Rather than assuming people to “[lack] the very *capacity* to [be a science person] without the intervention of the educator,” (Biesta 2010, p. 542) science educators might consider beginning from ontological assumptions that begin with abundance.

Acting and thinking slowly

Neoliberalism demands product development. In the case of science education, students, science teachers, and science curricula are the desired product. Given the necessity for ethico-political hesitations as a response to the inherent relationship between neoliberalism and science education...

might we gasp?
 might we pause?
 might we wonder?
 might we hesitate?
 might we think anew?
 might we move slowly?

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