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‘Making you aware of your own breathing’: Human Data Interaction, Disadvantage and Skills in the Community

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Introduction

Sarah Hayes is Professor of Education and Research Lead in the School of Education, Bath Spa University, UK, and a Principal Fellow of the HEA (PFHEA). She is an Honorary Professor at Aston University, Birmingham, UK, and an Associate Editor for the *Postdigital Science and Education* journal. Sarah co-edited *Bioinformational Philosophy and Postdigital Knowledge Ecologies* (Peters, Jandrić, and Hayes 2022). She is the author of *The Labour of Words in Higher Education* (Hayes 2019) and *Postdigital Positionality* (Hayes 2021), which opened debate on how disadvantage manifests in the disconnect between inclusivity policies and the widespread digitalisation and datafication of society.

Michael Jopling is Professor of Education at the University of Brighton, UK. His research examines education policy and its effects on schools and universities, particularly in relation to issues like leadership, disadvantage, and inclusion. He is the link convenor of EERA’s Children and Youth at Risk and Urban Education network and associate editor of *Management in Education* journal¹. His most recent publications have explored the impact of education policy and the pandemic on schools and vulnerable young people, the postdigital school, and the tension between inclusion and standards in education.

Stuart Connor is a Senior Lecturer in Education at the University of Derby. With thirty years’ experience in Policy Analysis and Futures Studies, recent publications have explored relationships between developments in the fields of mobilities, futures, and postdigital studies and the different forms of data and power in postdigital society. His current research interest is the ‘power of data’. This includes the study of data use practices, how data are enacted in practice, and what this reflects and realises regarding agents’ perspectives on the reproduction, disruption, and transformation of data regimes and systems.

Matthew Johnson is Head of Research at Runnymede Trust, where he leads on all research pillars including education and skills. He is completing his doctoral research, specialising in International Education, at the University of Sussex. Matt has an interest in the inequities of data in the postdigital world and the pathways to address them. He is particularly interested in a comparative approach, drawing lessons from economies and systems from beyond the UK to inform domestic policy and practice.

Sally Riordan is a Senior Research Fellow at the Institute of Education, University College London. She specialises in research into the use of evidence in education, especially with regard to social justice. Sally led the ‘Against the Odds’ study on behalf of the Social Mobility Commission into the progress of students facing socio-economic disadvantages

¹ See <https://journals.sagepub.com/home/mie>. Accessed 7 December 2023.

(Riordan, Jopling, and Starr 2021). Her recent publications have focussed on the challenges of bringing research effectively into classroom practices and the limitations of using meta-analysis to synthesise research findings.

About the Conversation

The edited book *Human Data Interaction, Disadvantage and Skills in the Community* (Hayes et al. 2023) is the culmination of a series of inter-related projects initiated at the University of Wolverhampton before and throughout the Covid-19 pandemic. During this time, researchers at the Education Observatory research centre were working with organisations across the West Midlands to tackle and research issues of digital inclusion and inequity. When it became obvious that it was insufficient to look at what communities did or did not have access to, the projects developed in a multitude of ways, exploring how human data interaction has become an integral part of being human and what this means for local communities. As a result, the collaborations asked whether a theoretical framework regarding human data interaction could be useful to support extra-academic work, and how non-academic partners could support elaborating and enriching this framework. In November 2023, the editors came together to reflect on the unusual qualities of these collaborations and how they had come about, as well as considering what they had learned from the process and why it is important that the publication of the book should only be regarded as a report on work in progress.

Postdigital Cross-Sector Collaborative Dialogue

Sally Riordan (SR): Welcome everybody and congratulations on the publication of your book, *Human Data Interaction, Disadvantage and Skills in the Community* (Hayes et al. 2023)! I think the one thing that really struck me about this book is how it came out of collaboration with so many different kinds of partners and the role that you were playing as academics in bringing diverse people and organisations together. So I wanted to start by taking you all back to those research projects that set this off during the Covid-19 pandemic. Can you tell us about them?

Sarah Hayes (SH): I'm going to take it back even further, if I may, and say that we were all working in the same research centre, the Education Observatory [at University of Wolverhampton, UK] as led by Michael, and we already had work under way that was reaching out into the community (Hayes et al. 2020). For example, annual Education Insight reports (Jopling and Johnson 2021), that were connecting with different agencies, charities, and other local bodies (Connor, Mahoney, and Lewis 2019) and research for the Social Mobility Commission (Riordan, Jopling, and Starr 2021). So I think the work that the group in the Education Observatory was doing in the West Midlands, UK, was the background. Then later, when I attended a workshop in Scotland at the beginning of 2020 to hear about the Engineering and Physical Sciences Research Council (EPSRC) funding for Human Data Interaction (HDI) projects, I brought it back to discuss with Stuart and then Matt.

Stuart and I initiated the grant application for the first project about data and disadvantage in relation to digital skills strategies in the West Midlands region and Matt had his ear to the ground on all of that. We then thought that we could shape another small project bid around this interest. We emphasised the data aspect because it seemed to be lacking (Hayes et al. 2021). That was how the book began to take shape. Eventually we got the funding for it, and we were able to design it as a set of collaborative activities with cross-sector groups, of which I would say Matt and Stuart had better knowledge than me at the time.

Matt Johnson (M): I think part of it came out of this concern locally and regionally around the digital inclusion gap and the digital skills gap and the risk that developments would further increase the divide. There was a real opportunity that came from the digital sphere and through data, but there were also significant risks. I think it was really important for us to

understand organisations and to work closely not only with academia, but also with communities on the ground that might actually be affected by things like increased surveillance and may not know about their rights. It was led by the disadvantaged contexts we were working in and our desire to be further embedded in the local ecosystem.

SH: The actual working of the funding for what we did in terms of hosting events started at the time of the Covid-19 pandemic and Stuart was instrumental in designing those meetings. We held four online events across the two funded projects, which included presentations from a range of contacts: charities and people from business, the local council, as well as education – Further Education (FE), Higher Education (HE), and schools. We had a lovely cross-section of attendees at that first meeting, and it helped that we were part of the Digital Inclusion Coalition that the West Midlands Combined Authority had set up. Stuart designed a ‘What If Situation Room’, which was an exciting development in the project.

Stuart Connor (SC): I was really excited about the prospects of the concept of postdigital. That was something that came out of working with Sarah in particular and learning an awful lot about, and then discussing the idea of Human Data Interaction (HDI) (Mortier et al. 2014). But before I get too excited, I like to see where other people are at, how they are making sense of data and digital, and whether HDI has a value. We thought that the idea of bringing in as diverse a mix of organisations as possible to see how they are making sense of topics around data and how they're making sense of topics around digital would be a good way of interrogating what we mean by HDI, which was a concept that we thought a range of practitioners would actually find really valuable.

For example, one of the things we found very early on was that when people talk about the digital, it was very much this notion of a digital gap and digital exclusion. There was an implicit imperative that it's a good thing to get people included, but very little, if any, attention being given to the potential downsides, monitoring, surveillance, and positioning, that result from inclusion. This apparent absence can lead to a neglect of the concerns of those who may be reticent, if not avowedly suspicious, and distrustful as to the motives and alleged benefits of digital inclusion. So initially I wanted to try and get an idea of the different agencies involved, how they were making sense of the digital imperative, and how aware they were of data and anything that was being discussed in the critical literature about the issues regarding HDI, particularly around issues like surveillance. To help stimulate and accelerate some of those conversations, we posited ‘What if?’ situations and scenarios, thought experiments to try and prompt the conversations (Ross 2017). For example, what would a digitally included society look like and what would be good or bad about that? That was really, for me, the reasons behind getting these groups together.

Connecting The Dynamic Cross-Sector Dialogue with HDI Theory in Diverse Contexts

SH: The tail end of that first ‘data, disadvantage, and digital skills’ project led to us creating a policy briefing and being interviewed to showcase the work on the HDI website (Human Data Interaction Showcase Projects 2021). Then we thought we would seek a bit more EPSRC HDI funding to extend the work, which resulted in a second bid, which focused on HDI theory. At that point, we were thinking that so much had been contributed by different people from different sectors, we thought it would make a wonderful edited book. So that was what we put forward to the funding body and we received the funding. Then we approached the people who were presenting at our different online events to send us an abstract, and the abstracts were very, very, variable at that point. The diverse nature of our participants meant that some were fully formed abstracts, others were a couple of lines or just the presentation slides that the person had used.

This made us realise that we were taking on a rather different type of editing project. At this point we were also joined by Michael as we looked at the book and the shape it was

going to take. I would say that it was moving into a completely different area of work, but all that we've just talked about was underpinning it. Then we moved into seeing what sort of shape it would take in the months following, as we worked with all of the individual authors. There are 15 chapters in the book from a very diverse range of contributors.

SC: The whole process was iterative and emergent. It's not that we had a blueprint at the beginning and then kind of executed it faithfully. We tried to establish an ethos to describe a process and some broad parameters, but then we threw it open wide. We really didn't know what was going to come back. We really didn't know in advance what the processes would be. But that was deliberate. It's because we felt that if you are going to access multiple voices, you can't expect all those voices to suddenly sing to the tune that you want them to sing. You've got to listen to what they're willing to sing in the first instance. That's really important!

The other thing, as Petar Jandrić (2023) picks up in the preface to the book, is I think sometimes we forget in universities, we're not the only people who deal with theory. People do this in their different ways. And so, we were very interested in picking out what the theory and practice was. We used dialogue deliberately rather than debate because it was about creating open spaces in which to hear a polyphony or cacophony of voices, depending on your perspective.

SR: There was something very special about the environment that we had in the Education Observatory at University of Wolverhampton at the time and about how we were trying to reach out to bring people in, like Stuart says, a really meaningful way. That's something that I've carried with me and taken forward, something that's changed me and the way that I approach research. It's more difficult to enact in other places because we created a space that worked at that time, I think.

SH: I'm glad you said that, Sal, because I think Michael and I tried to bring some of that context into the Introduction to the book (Hayes et al. 2023). I echo what you say about us now going to different places of work and taking that spirit of postdigital dialogue and cross-sector collaboration with us.

SR: I'd like to ask about the way that the book was put together in quite an iterative and dynamic way, as Stuart has been saying. Can we reflect a little bit more about those experiences in terms of co-editing a book, which is always quite a challenge? I'm wondering how it's made you think differently and what deeper understandings you've reached as a result of co-editing this work?

Michael Jopling (MJ): I was involved late. I can't remember quite how that came about, but Sarah, Stuart and Matt suggested it might be possible for me to be involved. So having seen a successful bandwagon, I jumped on it, and it was a very interesting, positive experience. I was involved in the second project and the second round of events. I think one thing immediately struck me. We seemed to have different people from different backgrounds, who were speaking different languages. We had academics speaking a theoretical language. We had people working very much hands-on with young people on things like skills development, digital skills development, who were speaking another language. As Stuart said, this was very much theory-informed but without that necessarily being explicit or conscious. And then there were people from the local environment, businesses, local government, and local policy, who were somewhere in between, who were responding to sometimes very strange directives from on high and imposed measures. I think I saw in those events that people, languages, and different forms of discourse were coming together. You could see that we were starting to understand each other, although it was only a small step because there wasn't a lot of time involved.

I think that guided the editing process because we had people writing with different histories, traditions, and experiences of writing. We had to try and bring together the kind of academics who are used to academic writing and who write in a particular way with others

from different contexts and sectors who needed a lot of support and encouragement. That was an interesting process because the way that we usually peer review and edit books is quite robust, shall we say, and follows a particular way of doing things. Whereas we couldn't do that with this book because people would quite rightly say, 'We've enough to do. Why do we have to write in this way?' We were trying to be much more flexible in our editorial support, so that it's hopefully not quite as academic in a traditional sense as other books are. I'm sure we could have gone further with that and made it more accessible and more non-academic-friendly, but you've gotta start somewhere, haven't you?

SH: I like the idea of you saying that you've gotta start somewhere because it suggests that this is still ongoing for us, and I hope it is for all of us, because I think it opened up some of the dimensions you mentioned, Michael. For me we were seeing people gradually and critically taking on board the idea of HDI, when those different people and bodies outside of universities had been working so much, as you said, with the sharp end of disadvantage in different contexts. This was to do with digital devices, with providing people with Internet access and thinking about skills and employment, but not necessarily addressing the fact that data is really all pervasive and affects all of us in different ways in all of our lives constantly.

For example, the surveillance aspects both online and offline, the day-to-day things that you're just trying to grapple with when you go on to websites and have to accept or reject cookies, or even whether you can pay with cash, or not. All of these different types of things that now make us wonder what data really is. In so many ways, I think it was fascinating for us to have had the events. Then when you get the different chapters coming in and you do quite intensive editing and support for people who haven't written academically before. We went as far as having to maybe rewrite a section and send it back and receive the approval of the person. A really quite interesting dynamic.

We also worked on other chapters with more academically focused people and groups from different universities working together. That's a very different process and focus, from when you're working with someone from a council or a business. I think we found that range both fascinating and tiring, but it was still something you want to continue because you realise it's actually really valuable.

I also wanted to add a reflection on the postdigital side of it, concerning the Springer *Postdigital Science and Education* journal and book series² that the book is a part of. Colleagues and networks across the world have been involved in different types of disruptive forms of publishing, because the idea of collective writing is to appreciate and address the fact that people from different parts of the world and different cultures don't necessarily get the same access to publishing. The edited collection has been 'a standard publishing vehicle that stands alone among other collections as an academic form of writing that since its beginnings in the nineteenth century has been taken for granted and has remained unchanged in terms of its conventions' (Peters, Jandrić, and Hayes 2021: 283). Bringing unconventional and diverse cross-sector voices into the mix brought an important breadth (Hayes et al. 2020). There are lots of dimensions to this in relation to the background of postdigital writing and publishing. We're bringing perhaps a different angle again to that now, with this cross-sector aspect to the authorship.

Is A Book So Different to A Music Compilation?

SH: I hope that we'll be able to continue this sort of activity to see where it can go. The only other thing to just say is that recently Michael and I did a presentation on this type of editing process, making analogies to a music compilation. This reflects the fact that the book took off in different ways. I'm not sure if you want to comment further on that, Michael, but the idea

² See <https://www.springer.com/series/16439>. Accessed 7 December 2023.

was, is editing a book so different to creating a music compilation? Given that data is data and central to both activities.

SR: Yes, when I spotted that chapter, I thought Michael wrote that bit.

MJ: Some of it, but Sarah came up with the idea. I got carried away with it all and started talking at length about the use of mixtapes in hip hop, which is not something I'm particularly expert on, but it got me excited for a while, although that's not in the book actually. That's one of the things to pick up in future work, perhaps drawing on James Lamb's (2023) great recent article on using the music playlist in education research.

SH: I think some of this stemmed in any case from email conversations where we were bringing music into the analysis at times. It was just a background thing, but making these sorts of analogies is sometimes really useful. Perhaps also more than useful as a reminder of the ubiquity of data across so many creative platforms where humans now interact. Take as an example, Spotify Wrapped, and concerns raised that people 'not only participate in their own surveillance but celebrate it and share it and brag about it to the world' (Murray 2023). With the book, it seemed as if we were adopting quite a different process that picked up aspects of some other creative media. Yet at the same time as enjoying ideas on creative editing analogies to a music playlist, we are aware that more and more companies now track users, capture their data, and store their personal listening habits.

SC: I just wanted to add that for me it almost became an analogy of the phenomenon we were looking at because it raised the question of what does good look like? To answer that question, you realise that it's a positioned response. Who are you writing about and for? You're actually constructing a reader, and this is what I'm saying about the inclusion idea. You're not including people to do the things that you want people to do. You're trying to open up the space that people have been included into. It's a question of who is the leadership for this and what do they want from it? I found reflecting on the process, the early workshops, and the way that Michael described the different narratives and the different discourses and the different positions in a dialogue situation where it's free flowing, it's really wonderful and you like watching that.

But then when you're fixing that on the page, it feels a bit more restrictive, but it also makes you surface the issues which are often underlying those so-called open dialogue type conversations. This makes it more challenging, but I think at the same time it does reveal the structural aspects of what you're doing when you're doing some writing or research. That was really useful. As Sarah has alluded to already, it's really meant to be part of a conversation. It wasn't meant to end. It was meant to be a platform for our ambitions in terms of what would follow next in terms of opening up more spaces and multiple spaces and getting people involved in setting agendas around these spaces. And I learned loads. What more can you ask?

SR: I think I had a similar feeling when reading about your analogy with a music compilation. For me, it was because the contributions in the book were so different. It felt to me that you were, to a certain extent, trying to resist coming up with an overall finding and trying to resist pushing them together too much. The chapters stood separately and complemented each other from very different angles and with different questions and different approaches. Following on from that, can I ask you are there general messages from the book or general themes, or any particular insights from particular contributions that you'd like to highlight? Let's talk about the contents. What's in this book?

What Is in The Book?

SC: It's the framing of the response that's interesting. I don't think you're going to get the same answer from each of us.

SH: I can say that we set up a structure for the contents of the book under what were called the tenets of the Human Data Interaction (HDI) framework, which has a computing

systems origin. These tenets are *agency*, *negotiability*, and *legibility*. HDI is a development from Human Computer Interaction (HCI). That in itself is interesting and ironic if you consider comments from Gary Hall, who said in 2013 that computer science as a discipline is not necessarily best equipped to understand itself and its own founding object, let alone to help those in the humanities with their relation to computing and the digital (Hall 2013: 2). Yet, I would say that there were all these different dimensions that we were bringing to something that essentially is coming out of a computing and systems design concept.

There is a particular article (Mortier et al. 2014), that we draw on that is the basis of human data interaction. When we talked with the authors about where their chapters might sit, it made sense to structure the book around these 3 tenets, plus one more that developed during the course of the funded projects, the theme of *resistance*. Some of our authors emphasised the importance of *agency*. How much agency do any of us have when connecting with data? Then there were sections about how *legible* and how *negotiable* our interactions with data are. Finally, we added a further section focusing on whether and how we should *resist* data interactions.

Of course, this isn't a true grouping because many of the chapters overlapped. But for the sake of a neat table of contents, and again the publisher and publishing aspect were influencing us, it was important to ask, where do you sit it? It would be nice to be even more disruptive, but at the same time you've got some reference to the framework that the HDI funding was associated with. However, that doesn't get us on to the individual chapters. I don't know if others want to comment on individual chapters themselves.

MJ: One thing that strikes me looking at the book again is the range of contexts included. I learned quite a lot about things that I didn't know I was interested in. There's a chapter on ophthalmology and optometry and the potential for human data interaction (Boychev, Schmid, and Jonuscheit 2023). Data are obviously a huge aspect of everything everywhere and the book's different perspectives are looking at how data operate in ways that we don't necessarily see. Partly it was seeing different impacts in different contexts. There's something particularly interesting about the resistance section because, as we've said, that wasn't in the original HDI framework, so it's a response to aspects elsewhere in the book. For example, David Meechan's (2023) chapter on data in the early years and the datafication of young children is really interesting and quite scary.

One thing we knew even as the initial project began was some of these issues around the amount of data that are captured on everybody and the fact that we don't know where those data are and what's done with them. It gets bigger the more you look at it and you think about how much data are held about a child before they even go to school. You think, why are we not resisting that or at least asking more questions about it? There are hundreds more areas we could have looked at. And then the final thing I would say is that Artificial Intelligence (AI) wasn't really part of the debate, or the dialogues to use the right word, when we were hosting the events. It would be now, and I think it was good that Sarah brought ChatGPT into the introduction we wrote earlier this year. Now we're at the point where slightly surreal debates are going on in public discourse about what's going to happen with AI (Hayes and Jandrić 2023). I think it would be interesting to apply some of the conclusions, the fears and concerns that come out of the book to the challenges, but also the possibilities, that AI represents (Watermeyer et al. 2023).

SH: Matt and I were talking this week about AI and some of the ongoing work we might collaborate on in relation to that. I know during our presentation about the links with music that we did recently, Michael, we wondered whether the whole artificial intelligence issue was possibly drowning out other aspects of what data are doing and how they are being used. The question is whether the AI hype is not necessarily helpful to people who might be

struggling in some of these data and disadvantage areas. You've got some conversations going on about that at the moment, haven't you Matt?

M: As you say, this is rapidly increasing within the UK context. You've listed the four areas of *agency*, *legibility*, *negotiability*, and *resistance* and I think what really stuck out for me in the book was that, although you may have legibility and understanding to some extent, agency, negotiability, and the ability to exercise resistance are more problematic. This is seen most darkly I think, again as Michael pointed out, in the datafication of education in England. It's a feeling of helplessness. Even through children's rights are enshrined in the United Nations Convention on the Rights of the Child (UNCRC)³, technology and data seem to undermine those rights in a way that Meechan was unable to overcome. There was a particular quote in that chapter that I thought was quite potent: 'Unfortunately, as a parent, my concerns for my child's rights and data have been rejected by the Department of Education in England.' (Meechan 2023: 237) Whilst there was legibility in terms of the Reception Baseline Assessment process, it was not possible to have agency or negotiability. That made me think about what the future holds. Where are the ethics and ethical considerations? How do we ensure that actual human rights and children's rights are upheld as data and human data interaction advance?

SH: I think you've just summarised how those computing concepts, which were originally about computing design, have been extended into the social world and the situations where people are either included, or not. One chapter I always come back to is the opening chapter written by Uche Ogwude (2023). Uche is at Aston University, in Birmingham in the UK, but he's looking from the point of view of different communities across the world where people do not have a chance even to input into the creating of data. This means that he's coming at the issues from such a different angle to many of the other authors. He says that research into data has largely fallen into silos, which are focused on access and people being able to access or use data. If you adopt a more global perspective, that forces you to examine who gets to create data in the first place, given its all-pervasive nature (Ogwude 2023: 3).

In terms of the other chapters, the one describing Digitally Included Wolverhampton from Wolverhampton Council looked back at the regional context, drawing more on the first set of events, but bringing in regional aspects (Bentley and Clark 2023: 15). Michael mentioned the chapter about optometry, but then we had other people who were looking at digital inclusion in relation to smart health and our privacy at home (Manohar, Sengul, and Chen 2023: 151) in relation to your heating system or your Amazon doorbell. You could say that there's a hugely diverse database of sorts even in the book itself!

M: There's definitely huge diversity and complimentary themes. In terms of the analogies of data as a musical compilation or composition, it didn't feel like noise. It felt more like a symphony, I would say. I think the way the chapters are connected together was quite beautiful.

MJ: Nothing wrong with noise.

M: That's true.

MJ: There's also a point which you mentioned I think, Matt. It's interesting that you started off in the initial project quite focused on the local context in the West Midlands, and because of the open and emergent nature of the approach, as Stuart emphasised, the participants ended up in all kinds of places. I think that's an interesting strength of the book, but it makes you wonder how it could have been more open and more emergent. Our job now is to try and follow some of those routes that we didn't get to follow and find other kinds of music to draw on and fit into. I think it's interesting how far it developed from being quite focused on what

³ See <https://www.unicef.org.uk/what-we-do/un-convention-child-rights/>. Accessed 7 December 2023.

we were doing, and the interest we had, in disadvantaged contexts in the West Midlands, without us pushing it there.

Different Ways to Surface and Make Sense of How HDI Is Happening

SR: Can I pick up a little bit more on this HDI framework that's come from computing and these core tenets that you've structured the book around? I actually found that really successful and I thought that the individual pieces really supported the value and power of that framework. I think in the introduction you talk about extending and advancing the framework. I was wondering, on the one hand, it really supported it, but on the other, where was it exactly that you felt that it didn't quite work? How far is the book pushing the framework in a new direction?

SC: I think on one level it was and, probably on reflection, is enriching it. This is really a caricature, so apologies, but you almost had people who were very much at the fore of developing computing systems trying to make sense of humans, and then people whose job it is to make sense of humans. This group then suddenly became aware of computing systems and digital. They started from very different places, but then slowly converged (MacKenzie and Wajcman 1999). One of the findings I took from the book is that HDI is a really useful framework for people in lots of different settings with lots of different purposes to make sense of and to surface how human data interaction is happening, understood, and can be applied. That's part of where the enrichment comes from.

This is not to suggest that extending the framework means there's anything wrong with it. It's just to recognise that this is one particular narrative and discourse to make sense of the phenomenon that we're all experiencing. There are other narratives and discourses from other arenas which will also seek to make sense of it (boyd and Crawford 2012; Shneiderman 2022). But before we make it a theory fest, let's just look at how people are making sense of this in practice and where is it on their agenda. I think it's very easy from where you're sitting in the university to focus on what's interesting to you and what you think requires attention. This was an attempt to understand different positions and trajectories, recognising that problems, and the implicit explanation and posited solutions, are constructed within a complex, changing, and contested landscape (Bacchi 2009, 2012; Connor 2013).

MJ: What I'd add to that is the fact that we had an explicit interest and focus on disadvantage (without dwelling on the fact that there are no good terms for whatever disadvantage is describing), that pushed or encouraged people in a particular direction. When people were talking or later writing about the framework, the areas that they were moving towards in relation to disadvantage, that's where the *resistance* came through. It's the human part coming back in I think, so it was about resistance, it was about equality and inequality, and it was about ethics, which Matt mentioned before. These are the kinds of concerns that people have when we're focusing on HDI, whether it's exacerbating existing problems or creating new ones. It's essentially a political concern: What do we do about this?

Taking a framework that is applied from a computing perspective and emphasising the human part of HDI took us in those kinds of directions and I think that was quite useful. I was also interested, looking at the chapters as they came in, in how well they fit the framework. Sometimes we do the academic thing where we have a framework, we have data, and we put them together and make sure they fit whatever happens. We didn't have to do that. We sometimes had to encourage people to be more explicit about how their writing fitted with the framework, but it seems to be broad, pliable, and adaptable enough to fit the way people were approaching the issues they were describing.

SH: Following on from what you're saying on the framework, Michael, I was just glancing at the Afterword that Dragan Gašević, from Monash University in Australia, wrote for us (Gašević 2023). He gives us really nice insights from the perspective of somebody who's been involved in learning analytics and artificial intelligence from a systems point of view over

a lot of years, before it was so fashionable. He says he found the HDI framework very useful and wishes he'd known more about human data interaction earlier. He alludes to the fact that writing the Afterword gave him a chance to reflect on the Mortier et al. (2014) framework – legibility, agency, and negotiability – in discussing the socio-technical complexities of data (Gašević 2023: 300). As somebody primarily focused on computational design and the psychological aspects of learning analytics, he enjoyed all these different angles that the book was bringing to bear. He is reminding us how much the world has moved on, even as we've been writing the book (Gašević 2023: 302), and I think he's issuing a bit of a call to continue by identifying the next exciting challenge: to continue this research in the light of the explosion of the world of artificial intelligence.

SC: One final thing, which is not necessarily where I am now because I'm not sure where I am now, but where I was at the time, was just that the final notion of negotiability suggests that you have people who are willing to negotiate on both sides, or all sides. When you have people who aren't actually willing to negotiate, you can ask what value something like HDI has in that setting, which I think helped to open up the space to talk about resistance a bit more. What do you do when you can't have the conversation, but you still have agency and a need and an imperative to act?

Becoming Aware of Your Own Breathing

SR: I'd come across the phrase 'human data interaction before', but I hadn't thought about it very deeply. When using the computing framework you talk about Michael, you've been talking about bringing the human back in. I think most of us ordinary folk come at it the other way: in our world of humans, data are just something that we use, something that is instrumental. Focusing on human data interaction highlights data as something that we're interacting with, rather than humans interacting via data. That's something I started thinking about more. And I think, Stuart, you said it was a useful concept for people. It was helpful, right? Can I ask just a basic question about what it is we are talking about? Does this work change how we think about data?

SC: Well, personally I feel as though the fact that it's published in the postdigital science and education book series is really important because I think if you position HDI against the different narratives around postdigital (Jandrić et al. 2018), then that becomes interesting. Part of a response to critical questions about the form and function of data in the changing technologies of governance (Dalton, Taylor, and Thatcher 2016) are questions about if and how we draw the distinction between human and data and the nature of the arguably mutually constitutive relationship between them (Jandrić 2023). If you think about the pervasive (Shelton et al. 2021) and configurative nature of data (Madsen 2021), in the sense of data has become a little bit like breathing, just so integral, vital and yet given, to what it is to be human. This is what the postdigital concept brings: making you aware of your own breathing.

SH: On that rather human biological note, I'm not sure this is to do with this book particularly so much as other books, but there is the whole biodigital side of data (Peters, Jandrić, and Hayes 2022). Linking data with care during the Covid-19 pandemic and all of the innovations that are actually wearable or insertable into people through surgery. All of these different aspects of how data are interacting very physically and intimately with people. As Stuart says, it's very hard not to think of it as being rather like oxygen, completely integral and surrounding people, but also going right through people and their bodies.

SC: Absolutely. And there was a chapter that in many ways talked to that which was the college lecturers who were using smart glasses as part of their learning and assessment (Grace and Haddock 2023: 93). And I think the conversation is – smart glasses, great tool. The

immediate concern is how does this reconfigure learning and assessment, but then also asking, what data are we producing and for whom?

What responsibility do you have as educators to inform students about that? Is agency an issue or are you just happy to have a new resource that's been made available at low cost or for free to help you do your sessions? Is there any kind of legibility as to what's happening with that data and how they're being used? What are the incentives for people to make this available to you and where is the scope for negotiation? That was just a good example of something becoming part of your practice. You use smart glasses, you wear them all day. You collect all these data, it's all recorded. It just happens now and underneath that are questions about data and how they fit with our existing data infrastructures (or not). I know it's a bit of a cop-out, but I think there are absences in the book. They're there because that's not where people were at. That wasn't their agenda. We can get lost sometimes, thinking everyone's concerned about this and everyone's doing that, but they're not. There's lots and lots of other stuff they're going on with. If we want to have conversations with them about the issue we're interested in, let's start from where they're at and try and show how this is a useful concept for their practice.

SH: This puts me in mind of an early concept that Matt brought to this in the first project of 'demand-led research'. We've talked about that this week, haven't we, Matt?

M: It's reminded me of the entire concept of demand-led research. I think particularly in this sort of world, because technology is moving so quickly and because this is so new and impacting people and communities and organisations in various different ways, it's critically important to have a demand-led approach. The unpredictability of how this is moving and changing requires you to have your ear to the ground. Demand-led was a key concept throughout all of the HDI work and I think in HDI more broadly. It's important to take that approach.

SH: I think that sort of building from grassroots understandings was definitely something I remember us discussing with you, Matt. And I'm thinking again that Stuart's point about how you know, we don't have to try and fill those gaps because people were coming from the point that they were at, is a hugely important one. And when you've got people like Ben Williamson, who's covering so many fascinating theoretical angles on all of this, as well as actual practices that are in use in the world in companies and in relation to education. For example, in his research on infrastructuring educational genomics, Williamson (2023) discusses the ways that technoscientific transformations in molecular genomics have begun to affect knowledge production and policy in education. He argues for critical attention to be paid to a reconfiguring of the human subject of education, as searchable and predictable, through algorithmic processing of bioinformation. He points to data-intensive educational genomics and 'realistic' biological explanations that are being put forward for complex, socially-situated behaviours and outcomes, while devaluing other forms of knowledge production or claims to reformatory authority (Williamson 2023). There are so many dimensions that you couldn't possibly present it as a conclusive research field. It requires more and more contributions from different angles.

SR: And that idea of unfinished business is a good place for us to wrap up. Congratulations again on producing such a unique collection of collaborative work. And thank you for such an enjoyable discussion.

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