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'Measuring' methodological artefacts – thinking critically about surveys via knowledge of 'biobanding'

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ABSTRACT

Surveys can efficiently generate big datasets, but they can misrepresent participants' understandings. Our article discusses the potential for surveys to produce 'methodological artifacts' when measuring complex phenomena, via a project exploring parents' understandings of biobanding in youth sport. Although 99.5% of survey respondents ($n = 389$) indicated that they understood biobanding, follow-up interviews with 11 participants revealed this to be spurious data. This contrast between survey and interview responses highlights the limitations of surveys in capturing nuanced understandings. We argue that this misalignment between the object of study and the chosen method results in findings are 'methodological artifacts' rather than reasonable representations of social life. As such, the study demonstrates how seemingly simple survey questions about biobanding were actually attempting to tap into the complex processes of human knowledge production. Around this finding, we build an accessible and practical discussion of research philosophy that leads us to caution against developing knowledge claims based on 'wonky' epistemological foundations. And we encourage colleagues to carefully consider how their chosen methods might usually frame but also misrepresent, or unduly distort phenomena under investigation. We conclude by calling for deeper reflection on methodological choices, particularly when research is guided by the constraints of academic structures rather than scientific principles.

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Epistemological truisms

All methods of gaining knowledge are epistemologically fallible. That is, when we attempt to understand something, we must use concepts, theories, models, and ideas, which are historically, politically and culturally shaped. This process relies on socially produced and imperfect languages that are all pulled together by/via a metaphysical phenomenon – housed within a squishy and bony biological body – that we do not, and perhaps never will, fully comprehend: human consciousness. And, as such, our knowingness is always inherently context dependent and necessarily incomplete. There is, and never can be, a perfect 'one for one' relationship between our ideas about an object of study and that object. While it might be tempting, especially in a discipline like physics with its relatively high degree of statistical accuracy, to miss or underplay this inherent separation, 'the notion of producing perfect knowledge is a myth – and most scientists will happily acknowledge this as a foundational principle of their work' (Matthews 2024, p. 10).

This philosophical truism sits at the core of a sceptical scientific sensibility. But the impossibility of perfect knowledge does not mean that all methods are equally imperfect. Because, of course, scholarly ways of building understanding do indeed 'build' – that is, we scholars aim to advance upon empirical and theoretical foundations to produce more refined, robust

and considered alignment between our measurements/observations and the realities of the social worlds we share with others. And, therefore, over time, certain methods are usually shown to be more or less useful – i.e., better or worse than others for helping us depict an object of study.

All methods mediate our knowledge of things. That mediation acts to reveal and conceal features and qualities of phenomena. This means it is very common that one way of collecting data is of more utility than others, depending on context, approach or the questions which need answering. Within the process of figuring out which methods are better than others, there is, then, also an associated need to align our methodological strategies with the parameters of the empirical 'contact' researchers are trying to make with the stuff we are interested in. In this regard, rather than a simple process of replacing a tired, outdated method with a newer, or apparently more sophisticated one, scholars also seek to ensure they are finding a more refined coherence between the problems they face, the questions they must ask, the data they think they need, and the methods they develop, design and do.

In a perfect academic world, these two processes – methods being refined over time or correctly chosen to suit a specific project – proceed in a way which holds the scientific principles of increasing 'reality congruence', accuracy of measurement and precision of knowledge, as its guiding light. But no such

world exists, and the reality is that the scholarly systems we often work within do much to push and pull, constrain and enable, the research we do, the approaches we adopt and the methods we pick. This means that there are numerous reasons why we might find ourselves producing knowledge which is guided by the requirements of funding, limitations on time, pressures to produce outputs, ethical constraints, our own (in) abilities and skills, over and above the methods that are more scientifically coherent. And it is an example of the problems that can flow from this that we take aim at in this short methodological note.

Surveys – contextually useful and efficient but potentially epistemologically wonky

We focus on the use of surveys to measure phenomena which we think can be better understood using different methods. Surveys can be great at producing relatively big data sets efficiently – see for example, Savage's et al. work on social class (2013). And they can help provide many insights at population, community and group levels. Of course, we do not suggest that it is simply size that matters, because surveys are also relatively cost-effective, or as we prefer 'cheap'. And this cheapness – both in terms of financial and time cost – aligns with the pressures that many scholars face in terms of keeping their research moving forward while also delivering on various elements of their jobs; writing grant applications, teaching, administration, pastoral care, and more.

The use of simple and clear questions in surveys lends itself to exploring topics around which there is a pre-existing level of intersubjective understanding within the sample under investigation. For example, if one wants to know about the amount of dog ownership in the UK, questions such as 'do you own a dog?' and if so 'how many?', would leave only very few English speakers confused and unsure. Therefore, a survey, with its potentially large reach and efficiency, would work well for this research. But even here we would need to consider who is excluded based on not understanding English, and the ways this might affect one's knowledge claims, especially in such a multicultural country.

In a more subtle way, respondents might question the nature of 'ownership', for example, perhaps someone found a stray dog 6 months ago and informally 'adopted' it, so while they think of it as theirs, the 'ownership' might still be somewhat contested/unknown. Or, perhaps, a family dog recently died, and the owners are in the process of seeking a new one, in this instance no dog is presently owned, but, of course, the family consider themselves as more usually dog owners. The point we are making is that even within simple questions, which can rely on *most* people understanding them, there will always be levels of misunderstanding, confusion and a misalignment in meaning.

A logical problem flows – scholars may be drawn to this 'cheap' method and employ it to explore something more complex than dog ownership. So, for instance, constraints on a scholar's time might mean that a methodological design is proposed that seeks to gain knowledge of *why* people own

dogs using a survey. While this might seem to be a relatively simple extension of our previous example, and some people might have quite simple answers, the reality is that such a question can have quite profound, emotional and unknowable answers. For example, pet owners often have connections to their animals that are so strong that they are unable to fully capture this, especially in a written format. So, while they might select 'companionship' or 'security' from a multiple-choice tick box answer or offer a couple of lines in an open text box response, such reductive explanations would not do justice to the complex experiences that would need to be represented if a more accurate answer was sought.

This is then a misalignment between the object of study (emotional connections and feelings of risk and safeness) and the chosen method. The findings that flow from such a process can be considered to be a 'methodological artefact'. The result in this case is that scholars may frame people's relationships with their dogs as overly reductive and simplistic. Of course, all science is built on some elements of reduction because the richness of our experiences cannot be grasped in their fullness in such rational accounts. But, our job is to work whenever possible to avoid this happening in egregious and/or unknowing ways. If such a wonky epistemological framing of our data does indeed happen, our work does much more to highlight the specific limitation and mediation of our methodological choices than it does rigorous empirical observations.

Unfortunately, unless scholars have a way of checking their participants' responses using a different method, it is very challenging for such artefacts to be 'measured' in any sense. And, in that regard, it is our contention that they are rarely reported as such, and instead such wonky epistemological work, can translate into wonky empirical findings upon which scholars might still seek to make confident knowledge claims about their objects of study. When this is the case – specifically when surveys are employed in contexts where they do not align well with research problems/questions – such a methodological approach is less than useless because it will provide not only relatively inaccurate data, but also quite false and decontextualised understandings. These are, then, 'methodological artefacts' that take our understanding of phenomena backwards, and thus sit in opposition to the principles of good science. Let us provide a case study from some work the four of us undertook exploring 'biobanding' in youth sport.

The case study – researching biobanding

Biobanding is a process which groups young people involved in sport based on their biological maturation rather than chronological age (Cumming et al. 2017). It has been applied as a supplement to traditional chronological grouping within training and competition with the broad goal of reducing maturity-related differences in size and physicality. Research primarily focuses on the effects of biobanding in soccer, but not much of this work comes from a sociocultural perspective (for some exceptions see, Reeves et al. 2018; Towlson et al. 2023). This means that there is a lack of knowledge about how, and in what ways, young people and their parents/guardians might understand, and, therefore, engage with, or be ignorant

Table 1. Biobanding vignettes.

Scenario	Vignette
"playing-up"	Imagine that your child is now 13 years old. Along with 4 other players, he or she is measured to be in the higher percentiles in the calculation of where they are in the developmental process. Consequently, they are moved up from the age-specific team (biobanded) to play with older players who are at a similar stage of development. They will be matched with players who are at the same developmental stage but older. Please respond to the following questions and statements about what you think regarding this scenario
"playing-down"	Imagine that your child is now 13 years old. Along with 3 other players, he or she is measured to be in the lower percentiles in the calculation of where they are in the developmental process. Consequently, they are moved down from the age-specific team (biobanded) to play with younger players who are at a similar stage of development. They will be matched with players who are at the same developmental stage but younger. Please respond to the following questions and statements about what you think regarding this scenario

to, some of the enhancements in safety that can accompany biobanding. With this in mind, the first four authors set out to explore Norwegian parents' understandings of biobanding in two different ways; a survey based on Bradley et al. (2019)'s work and follow-up interviews with a selection of the original sample.

Research part one – survey

To match our focus on parents, the questions were modified slightly. As the questions were originally published in English, they were translated into Norwegian using a back-translation process (van Widenfelt et al. 2005). In preparation for this paper, the survey was translated from Norwegian to English by the first author. Participants were provided with two vignettes delineating scenarios where their children would engage in biobanding by playing with chronologically older children ('playing-up') and another where they played with chronologically younger children ('playing-down'). Table 1 presents the vignettes, whilst Table 2 shows the survey questions and possible answers.

The survey questions were based on previous research by Bradley et al. (2019) but were modified to a 4-point likert scale instead of 5-point. A 5-point likert scale will have a midpoint that is assumed to be a neutral option wherein the participants have no opinion on the question. However, some authors are critical of the validity of a midpoint in likert scales, suggesting that it becomes a dumping ground when participants are unsure of the question or the context. Cumming et al. (2017) suggests removing midpoint responses when the topic is unfamiliar to participants. Biobanding is still in its infancy in Norwegian sport, particularly at the grassroots, and this is why we adopted a 4-point likert scale design.

A total of 560 people opened and began the survey. With incomplete responses removed ($n = 171$), 389 survey responses were analysed. The inclusion criteria required that respondents be over the age of 16 and have at least one child who plays or has played football in Norway. See Table 3 for further information on the participants.

Upon opening the online survey, participants were directed to the participant information section and informed about their right to withdraw from the study. Consent was considered to have been granted via the completion of the survey.

Research part two – interview

- (1) Parents who completed the survey were recruited to take part in an interview – their answers in the survey formed a basis from which their thoughts and experiences could be further explored. Each interview was

Table 3. Demographic information.

	N (%)
<i>Gender:</i>	
Male	210 (54%)
Female	179 (46%)
<i>Education:</i>	
Secondary school	4 (1%)
Apprenticeship	58 (15%)
College	23 (6%)
Undergraduate degree	150 (39%)
Master degree	114 (29%)
Doctorate	20 (5%)
Other	20 (5%)
<i>Currently coaching football:</i>	
Yes	223 (57%)
No	166 (43%)
<i>Coach education:</i>	
Yes	152 (39%)
No	71 (18%)

Table 2. Survey.

Have you understood the concept of biobanding?	Yes		No	
	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
There is a greater chance that your child will get injured during training in the new training group				
Your child feels more like a leader in the new training group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Your child has less opportunity to express themselves with the ball in the new training group, compared with their usual group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Your child has a greater opportunity to influence the game at training in the new group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
The training sessions are more physically challenging in the new training group compared to trainings with their chronological group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
It is more difficult for your child to demonstrate their technical skills in the new training group compared with their chronological group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
Your child found it boring to train with others who are not of similar age in the new training group	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree

conducted using a semi-structured guide containing open-ended questions such as ‘what do you think about biobanding?’ ‘What do you believe is the difference between “playing down” versus “playing up”?’ The second author conducted the interviews and made space for conversations to take an emerging course by using various probing questions to follow participants’ focuses where possible. This was especially the case when it appeared there was uncertainty, tension or conflict between their responses to different questions, including what they had previously stated in the survey – which invariably happened. The interviews ranged from 35 to 70 min and were transcribed verbatim as soon as possible after the interview. The interviews were delivered in Norwegian, and the translations below in English were completed by the first author. All participants are referred to using pseudonyms, and any identifying information has been removed or modified.

A cleareyed discussion of wonky results

When asked in the survey if they understood the concept of bio-banding, 99.5% ($n = 387$) of the participants selected ‘yes’, this included all 11 interview participants. Yet, during the interviews, when the parents were asked ‘what do you think about bio-banding?’ an obvious empirical tension came forth. The following examples are particularly illustrative:

No, just that it [biobanding] is new to me. I’ve never heard anything about it before. So, it’s like, yeah, maybe I’ll think more about it tonight and next week and think, yes I’ve understood it a bit more, or, yeah, I didn’t think about this aspect, and so on, that sort of thing. I’ve read, but maybe I only spent about five minutes doing the survey, so then it’s not certain that I caught everything. But I must say, it’s very interesting. It could very well be that in a week or two, I might have a completely different opinion. (Sander, 42, health assistant)

I haven’t completely understood it either, even after reading through the material, and I thought I had understood it. (Sander)

I was not familiar with that exact term, but I had heard a bit about it. But, I didn’t know much about it... So, it’s just some background information I know a little bit about, not specifics. (Ingrid, 44, higher education administrator)

It’s a bit of a tough question. I think the very word ‘biobanding’ feels a bit foreign to me. What actually is that? (Elin, 50, lecturer)

These responses instantly highlighted that there was something problematic and interesting within how the different methods had shaped the data. The second author reported this finding to the first author so the team could set about investigating this potential problem before continuing with further data collection and more formal analysis.

Of course, complexities, confusion and incoherence are something that we might expect when asking people to discuss topics using technical language (See AlHashmi and Matthews 2022, who make a similar observation in relation to how people (mis)understood concussion). But to shift from almost 100% saying they understood biobanding to 100% (admittedly of a much smaller sample) saying they

do not understand, points to something of more significance. This, we argue, is not simply some reasonable methodological difference that we might expect to come via epistemological mediation, but, rather, quite clear evidence of the survey producing spurious, misleading and ‘non-empirical’ artefacts.

The survey – given it offers no opportunity for dialogical, reflexive and creative questioning – could not pick up this wrongness. However, the interviewer, quite intuitively, probed the tension which was readily apparent to him. Indeed, there were instances when he would correct the participants when discussing what biobanding involved. The following two exchanges were typical:

Lars (46, teacher): ...but we are talking about (skill) levels here, in principle, aren’t we?

Interviewer: Indeed, biobanding might be somewhat misunderstood and hard to grasp, and of course, it does relate a little to level, because abilities are quite important in football. However, teams are actually grouped purely based on physical development. So, it’s really a measure to limit the physical differences, which can be quite substantial in that age group from 9 to 16 years, if we take a broad view there.

Lars: Absolutely. Then I just have to rethink in my head. It’s actually more about maturation.

Interviewer: What do you think of bio-banding? Now that you have read a bit or have seen what it’s about.

Sander: I really need to double and triple check to make sure I’ve understood it completely. But as I understood it after reading, it’s that instead of dividing the kids into age groups or such, it’s a bit more about their level. So, for example, an eight-year-old boy in training, they don’t just play with their age group, but if, for example, there is some talent or such in development, they can play up with those who are 10-years old, for example. So, it’s a bit of a mix of everyone. Have I understood that right?

Interviewer: Yes, almost. It’s more a division based on how far someone has progressed in their physical development, and not so much on skills or abilities. But of course, it might be somewhat related to how much you grow in terms of physical attributes or abilities.

Sander: Yes. Actually, yeah, I’m a bit unsure about it; I don’t know if I answered it like that or not. I can’t fully remember if I responded to that, I can’t quite recall what I answered for each question. No, I think a bit that physical attributes are not always the only or most important thing. A boy who is eight, who is much taller, for example, than the others in their class, I don’t

know if that means they should move up and play with those who are a bit older. No. I'm a bit doubtful about that. Right now, because all this bio-banding is very new to me, so I don't fully understand, perhaps, the advantage of it.

To reiterate, an explanation of biobanding was provided in the survey following completion of the demographic questions. The participants were provided with the following:

Biobanding is a strategy designed to mitigate the impact of the relative age effect. The relative age effect refers to the variation in age between two children born within the same calendar year. The time of the year a child is born can have a significant influence on the disparity in skeletal development between two children. A child born earlier in the year, who is also early in their development, can be up to 5 years older in biological age than a child born later, who is also late in developing. Biobanding involves grouping players based on the players' stage in the developmental process, rather than dividing teams by their chronological age. (e.g. U12, U15, U17 etc.)

This information came before the respondents could read the vignettes in the survey and answer the subsequent questions. Additional explanatory information was also provided in the participant information sheet given to the interview participants:

With biobanding, football players are organized into groups based on their maturation and development stage rather than their actual birth date. To assess a player's developmental status, we employ a formula that considers the player's current weight and height, as well as the parents' heights. This provides an estimate of the player's adult height and a percentage-based understanding of how far the child has progressed in their development towards this expected height. Players are then grouped into training cohorts according to this percentage, rather than chronological age.

Despite these two written explanations of how biobanding functions, many parents continued to believe groupings were influenced by performance level in football. Being moved up (i.e., playing with older children) was associated with 'good skills', whilst being moved down (i.e., playing with younger children) was associated with poorer technical abilities. For example, Elin and Magus told the second author the following:

I would probably think that being moved up is seen as performing well, while being moved down would be that you're not performing well enough, in a way. But that is kind of how we look at player development, maybe in today's context. (Elin)

What I consider important is that coaches don't move up players who aren't ready for a higher level, because then the players might not experience any joy or sense of achievement from playing at a higher level. (Magnus, 43, health worker)

So the survey provided two explanatory vignettes and the respondents answered the questions from [Table 2](#) twice, i.e., once in relation to the 'playing-up' scenario and once in relation to the 'playing-down'. Yet, most participants answered the survey questions differently based on whether they were referring to playing up or playing down. Logically, we might expect participants to provide the same response for both scenarios in the survey questions. The reason for such responses only became apparent in the interview data, therefore what we have been able to show is that when we can check responses using a different method, there is clearly misunderstanding, confusion and a misalignment in what biobanding means. Given this, our

assessment is that data from part one of the project is best understood as 'methodological artefacts' stemming from an epistemological misalignment between the object of study (parent's understandings of biobanding) and the chosen method (a survey questionnaire)

Conclusion – when does something become a methodological artefact?

Our argument should not be confused with naïve empiricist claims that there is one true world of experience 'out there' that our scientific methods can try to make infallible contact with. Of course, as outlined in our introduction, we frame methods as mediating *all* data/knowledge and, as such, we should expect differences between answers in survey and interview questions. However, what we have highlighted here is not such difference in degree, or even type, but fundamentally oppositional statements from research participants. That is, it was quite clear from the follow-up interviews that the 11 participants in the second stage of the research did not understand biobanding despite saying they did in the survey. The survey data was, then, spurious, misleading, and wrong. But without a little checking it could have become an empirical finding of which knowledge claims would have been made. We are left wondering how often such wonky epistemological work provides the foundations for wonky empirical claims?

We think that the survey 'measured' a methodological artefact. It is difficult to understand the working mechanisms underpinning such a phenomenon, indeed a separate study would need to be designed with the exploration of this in mind. But we can tentatively suggest the following as explanations:

- (1) Having scanned the descriptions and vignettes about biobanding, the participants felt it necessary to say they understood the topic. Not doing so would be admitting to either not reading in sufficient detail or not understanding a topic that appears to be discussed in relatively simple terms.
- (2) During the interviews, the fact of a 'researcher', who it would be fair to presume has knowledge of biobanding, might have encouraged participants to be more reflective about their (mis)understanding of the topic. That is, while that might feel like they had a basic grasp of it, sufficient to say so in the survey, the presence of a 'more knowledgeable other' resulted in them doubting their understanding.

The point we wish to make explicit, is that seemingly simple questions about biobanding were actually tapping into the very complex process of human knowledge production. That is, the iterative epistemological processes wherein we can come to understand things and also grasp something of the strengths and weaknesses of such knowledge. Clearly, when it comes to a technical and novel term such as biobanding, it is not possible to be confident that even if participants say they understand such a thing that they actually do.

While this is a point we're happy to make in relation to scholarly understanding of biobanding, our main interest is in

how this provides a clear articulation of a wider problem in how scholars might use survey data to measure certain phenomenon. All social scientific research is reductive, but a survey, almost by definition, must take this reduction to the extreme. In our case, this is shown when we attempted to reduce parents' knowledge of biobanding to a 4-point likert scale and clearly this did not do justice to the complexity of their (mis)understandings. If the survey data was considered in isolation, it would have been empirically justifiable to conclude that parents felt they understood the phenomena under question. And knowledge claims could have been built upon this wonky foundation.

It might be argued that our findings were the result of our survey design (closed, single response questions) and not the survey method as a whole. Braun et al. (2021) suggest that qualitative surveys (open questions where respondents type responses in their own words) *can* capture *some* of the richness and complexity of the phenomena. While this is a true statement, the words 'can' and 'some' both do a lot of work to make it thus. That is, an open text box answer relies on the participants ability to express themselves well using words, sentence and phrases and to be committed to typing out the experiential richness that is central to the human condition. In our experience, such linguistic skills and commitment are rarely evidenced. Meaning that qualitative surveys tend towards producing quite shallow, hurried and perfunctory qualitative data, even if *some* cases *can*, prove to be an exception to that rule.

However, during a well-delivered interview – and dialogical methods more broadly – a researcher can work to avoid being overly reductive by attempting to explore and capture the complexity of a phenomenon under question (see Matthews and Smith 2024; Matthews 2025). Indeed, despite putting forward a case for qualitative survey design, Braun et al. accept their 'fixed design means you cannot evolve questions during data collection, and you cannot probe or clarify individual responses' (2021, p. 647). One of our fundamental points within this methodological note is that when we *do* probe, clarify and 'dwell' with our participants (see Matthews 2025, specifically chapter 19), we are likely to gain a much fuller understanding of any phenomena that require something beyond the most basic of responses to be detailed.

We offer this critical reflection upon our own work, to provide a relatively simple example of a scientific problem which more-often-than-not remains hidden. That is, while all methods mediate our understanding of the worlds we share with others, there are ways in which they can measure methodological artefacts rather than offer anything like an accurate depiction of our objects of study. As such, we ask scholars to think deeply about how the phenomena under investigation might be framed and understood but also misrepresented by the methods they chose to employ. And this is especially the case if research is developed which is guided by the constraining effects of structures that are placed on science by the contemporary organisation of academic life, rather than a coherent and considered understanding of scientific principles.

Notes on contributor

MS, EB, VS, CI were involved in the original concept of the study. The data collection was achieved by EB, VS, CI and supervised by MS and CM. MS and CM drafted the original manuscript.

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Data availability statement

The data that supports the findings of this study are available from the corresponding author (MS). The data is not publicly available due to participants consenting only to anonymised extracts and aggregated data use, dissemination, and storage. This is in accordance with the Norwegian Agency for Shared Services in Education and Research (SIKT).

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