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Musical pathways through the no-input mixer

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ABSTRACT

This paper examines the use of the no-input mixing desk—or feedback mixer—across a range of musical practices. The research draws on twenty two artist interviews conducted by the authors, and on magazine and forum archives. We focus particularly on how the properties of the no-input mixer connect with the musical, aesthetic and practical concerns of these practices. The affordability, accessibility, and non-hierarchical nature of the instrument are examined as factors that help the idea spread, and that can be important political dimensions for artists.

The material, social and cultural aspects are brought together to provide a detailed picture of the instrument that goes beyond technical description. This provides a useful case study for NIME in thinking through these interconnections, particularly in looking outwards to how musical instruments and associated musical ideas travel, and how they can effect change and be changed themselves in their encounters with real-world musical contexts.

Author Keywords

No-input mixing desk, Feedback Music, Ergodynamics

1. INTRODUCTION

The no-input mixing desk, as a specific manifestation of feedback music, has been explored in one form or another since at least the 1960s. While it might not be considered a "new" instrument in the context of the New Interfaces for Musical Expression conference, it has taken on a new life in the 21st century, and provides a valuable site for exploring how a musical technology has spread, been discovered by individuals, and gained traction in different musical communities.

No-input mixing can take many forms, but typically involves plugging an output from an analogue mixing desk back into an input so that the circuit forms a loop: an oscillator. Feedback transforms the controls on the mixer. For example, the EQ dials that would normally boost or attenuate different frequency bands can cause smooth or abrupt changes to pitch, timbre, rhythm, or more holistic

behavioural changes. The no-input mixer has been highlighted as a point of inspiration for thinking about the design of digital instruments [4, 40, 32, 44] in a NIME context, and a range of digital augmentations [8, 29] and completely digital systems [50, 41] have been developed.

The paper follows on from calls [27, 23] to bring musicological and ethnomusicological methods to bear on expanding our understanding of new electronic and digital instruments, exploring the relationships between technologies, musicians, musical practices, and musical communities: "the field needs a stronger analytical approach into how music-technical elements travel across cultures, how the technology carries the music into new contexts, and what kind of musical dialogue ensues when a new technology is introduced" [23]. This research also examines the political dimension to artists' engagements with music technologies as highlighted by [30], along with questions of access and instrumental longevity.

This builds on existing work on feedback and music [46, 51, 24], particularly the recent Feedback Musicianship Network [18], and on work by Magnusson that considers the migration [23] and *ergodynamics* of musical instruments [22]. Magnusson proposes the term ergodynamics to bring together the material properties of an instrument with the wider cultural context and subjective personal experience to articulate experiences of engaging with that instrument.

We therefore examine different musical contexts in which the no-input mixer has been used, how artists have arrived at using the no-input mixer, and different ways of engaging with the mixer. We seek to highlight some of the variety in usage, beyond the work of some of the more visible proponents of the instrument. This provides a case study in the flow between the musical ideas presented by an instrument, and the musical cultures it encounters. This can serve as a useful template for thinking about similar relationships with new digital musical technologies.

The research draws on 22 interviews with artists who use or have used no-input mixing in their practices. Magazine and forum archives are also used to provide broader insights into no-input mixer use. This paper is part of a wider research project on the no-input mixer. Many issues are beyond the scope of what is presented here, such as a deeper engagement on discussions of control, interaction and agency (see [33]), a closer look at the actual music made with the mixer, or a more in-depth presentation of the interview data.

A zoomed out perspective on no-input use over time is given in Section 2, followed by a look at the importance of the low cost and availability of mixers in Section 3. Specific musical contexts that the mixer has encountered are examined in Section 4. Finally, Section 5 brings these elements together in a discussion of ergodynamics.

2. NO-INPUT MIXING OVER TIME

No-input mixing as a practice can be found in the feedback experiments of artists such as David Tudor [21, 34], Composers Inside Electronics [9, p 183], the Sonic Arts Union, Éliane Radigue [43], Pauline Oliveros [12], Jaap Vink [48] and Roland Kayn [42], amongst others. The artists interviewed for this study cited a range of other relevant origin points. Hendrix-style guitar feedback has been an influential model, with many no-input artists starting from feedback with guitars and pedals, and subsequently removing the guitar from the equation. Pedal-based feedback processes have been common in noise music [39, p 141], and a mixing desk provides a practical way to manage these loops. David Lee Myers—as *Arcane Device*—worked extensively with no-input matrix mixer feedback processes from the 1980s onwards, and describes this work as having come out of experimenting with delay networks, following Robert Fripp's *Frippertronics*. Simon Grab placed his use of the mixer as a continuity of dub mixer practices, e.g. King Tubby's use of delayed and filtered feedback loops [53].

The name "no-input mixing board" was coined by Toshimaru Nakamura in the late 1990s, particularly in relation to his series of releases *No Input Mixing Board* [35], *No Input Mixing Board 2* [36], etc. The explicit, exclusive focus on the mixer in the work, and perhaps more importantly, the *naming* of this technical setup appear to be crucial for the identity of the technical configuration as something that might be considered an *instrument*. An instrument is not merely a collection of physical properties, but is also the "locus of a rich and complex interplay of cultural associations and embodied practices" [26]. Naming it allows a process of *culturalisation* [15] to attach itself to a particular moniker.

Nakamura is credited by Will Montgomery—perhaps in a slightly tongue-in-cheek manner—as having started "the one man genre of no-input mixing board music" [28]. From coverage in The Wire magazine, this feels like an accurate summary: since 2000 they have mentioned either "no input mixing", "no input mixer", "feedback mixer", or "mixing desk feedback" on 112 occasions, with 83 of those occasions referring to Nakamura (74.1%). 25 other artists are mentioned explicitly as having used the instrument. This focus partly reflects Nakamura's prolific concert schedule and quantity of published releases (43 instances are album reviews for releases featuring Nakamura), but also misses a much larger range of underground practitioners. Jez Riley French links this to the naming of the instrument: "I think when Toshi coined the phrase "no input" [...] a lot of other work that was happening but wasn't in the high art, academic art, sound art cliques that latched onto the term, was pretty much wiped away, through no fault of Toshi" (participant interview). We can gain a window into this by looking at Vital Weekly[1], a smaller publication with more of a focus on underground music (artists can send new releases to be reviewed directly). This gives a broader picture of no-input mixer usage over the same time period. The search terms occur on 161 occasions, with only 41 of those (25.5%) relating to Nakamura, and covering a total of 87 distinct artists using a no-input mixer.

The no-input mixer has also been encountered in synthesis and particularly modular synthesiser communities. While "modular synthesis" doesn't delimit any particular musical style, the increasingly broad appeal of the practice provides a conduit for no-input mixing to reach a slightly wider audience, as an affordable way to explore related concepts. The popular Modwiggler forum has 133 threads that mention the search terms, 11 of which are dedicated specifically to the subject of no-input mixing. A range of primer articles have been written for publications like Synthtopia, Play Music Today and Create Digital Music, and introductory videos accrue tens of thousands of views such as Telekom Electronic Beats (39,507 views as of 19 Jan 2022) [49], Sarah Belle Reid's introductory tutorials (43,475) [45], and Richard Knight's videos on beat making (24,158) [19] and minimal techno (11,844) [20][2].

3. COST AND AVAILABILITY

A key factor, cited by several participants, in the uptake of no-input mixing is the relatively low cost compared to many other music technologies, and the wide availability of mixers (see Table 1). This was contrasted with the expense of instruments like the guitar or, more frequently, modular synthesis equipment.

Modular synthesis—particularly in its Eurorack incarnation—is renowned for being an expensive way to make music. Contrasting this with no-input mixing, Mira Martin-Gray notes the risk of modular synthesis "becoming more of an aspirational consumerist lifestyle than an art-form" [14].

Unlike modular synthesis—and even circuit bending in this respect—there is no obvious way to commercialise the practice[3]. The absence of a straightforward retail object may also be one factor in the no-input mixer resisting being seen an instrument in the usual sense.

Unlike many other music technologies, there is no sense of a price hierarchy. While different mixing desks were described by participants as having very different sounds and possibilities, a more expensive mixing desk does not necessarily lead to a richer or more flexible instrument (other than perhaps the number of channels or routing options provided). Often the converse was reported, with artists becoming attached to particularly cheap models or mixers with significant defects that manifest in musically useful ways.

A further advantage of repurposing a pre-existing mass-produced device is that there is less dependence on the manufacturer. A no-input mixer cannot be discontinued in the sense that other music technologies might be. Manufactured products such as Shakti's *No Input Feedback Mixer*, Landscape's *Stereo Field* and Herbs and Stones' *Pathways*, which employ feedback networks similar to those used in no-input mixing at the core of their designs, are limited due to the small scale boutique approach to manufacturing, and are unlikely to persist as long-term instruments by comparison.

For a number of participants, these aspects make using the mixer a political statement rather than just a pragmatic choice. For example, the ecological and political statement of reusing old equipment, of finding new ways of working with what is to hand rather than buying new products. The mixer was also seen as a way out of the commodity fetishism bound up with modular synthesis, switching the focus in post-concert discussions for example to being about sound and music rather than "gear", or with these discussions at least being reframed from the "what" of the product to the "how" of the process.

Finally, an important feature that no-input mixing shares with both modular synthesis and circuit bending is the potential for customisation: the same building blocks can be reconfigured in endless ways. The routing can be highly

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[1] http://vitalweekly.net/

[2] Chamberlain gives an account of exploring no-input mixing through a combination of Youtube videos, Modwiggler posts, and Nakamura's recorded output in [6]

[3] Although explicitly named no-input Eurorack modules do now exist, e.g. the Shakti DE-5 No Input Feedback Mixer https://www.thonk.co.uk/shop/de-shakti/

Table 1: Data extracts and references relating to cost and availability

Simon Grab (participant interview)	I liked this idea of like getting rid of the screen and going analog and I just did not have the money for it [...] looking around my studio like what do I have? I have a mixing desk which has like 32 tracks, and I have patch panels.
Mira Marti-Gray (participant interview)	It's appealing because it's cheap, right. It's not like something that I need to collect thousands of modules to get like a kick drum or whatever the fuck people do.
Mira Martin-Gray [14]	I am more interested in using what is at hand, pre-made, used—that is to say cheap—than collecting expensive equipment, or reaching toward hip new modalities like AI that intersect with capitalism and digital surveillance
Andrew Leslie Hooker (participant interview)	I got back to my studio, got the mixer, I had no idea how to do anything with it and I plugged some inputs into the outputs accidentally.
Liao Minghe a.k.a. Dino [16]	I found being in a band too tiring, as well as too expensive [...] each week we spent a few hundred bucks to rent a practice space [...] but buying instruments or other things was too much of a burden for me.
Sarah Belle Reid (participant interview)	[talking about reactions from people who she has introduced to the instrument] there's a little bit of skepticism and kind of curiosity [...] they realize that they have like an old mixer from 40 years ago sitting in their garage and they go get it and buy a couple of cables and like they start getting these strange chirping sounds and they have a lot of fun
Adam Saikaley (participant interview)	Something that I loved about it is it's affordability in comparison to modular synthesizers [...] it allows it to be accessible to a lot more people.
Philip White (participant interview)	I had a situation where I was on tour with Suzanne Thorpe, my laptop had died, I didn't have any money [...] but I had an old 1604 [mixing desk] and I'd heard about people doing mixer feedback.

personal: using auxiliary outputs, inserts, master output, headphone outputs, group channels, splitting channels with Y (or even W) cables to send one output to multiple places, incorporating the panning in different ways in the routing, experimenting with pre- and post-EQ settings, and so on. "It's that open-ended mode of self-discovery that necessitates a very personal relationship to the instrument" [14]; the mixer can be seen as a musical *opportunity* rather than a musical *solution* in the sense explored by [30].

For the NIME community, there are three considerations here that contribute to existing discussions around longevity and the wider take-up and of new musical instruments [31, 25, 13, 11]. Firstly, that accessibility in terms of both cost and availability allows the instrument to spread easily: in the case of the no-input mixer, only the idea needs to be transmitted. Artists who have read about the instrument or encountered it in a performance or recording can source hardware locally, and experiment for themselves. Secondly, it rehabilitates existing skills with mixing desks: a proficiency with routing, inserts, sends and returns, group channels, and so on can be brought to bear in working with the instrument. Finally, there is a richness to the instrument itself which seems to support long-term engagement: new sounds and behaviours can be discovered even after long periods of using the instrument. The potential for endless customisation, and the complexity of the feedback processes at play appear to be key factors in this respect.

4. MUSICAL CONTEXTS

This section traces no-input mixer use across a range of musical contexts: through reductionist music, free improvisation, noise, notated composition, rhythmic music, sound design, and finally pop music.

Nakamura's involvement in reductionist musical scenes in the late 1990s and early 2000s (*Onkyo* in Tokyo, Berlin Reductionism, or the New London Silence for example) is well documented [3, 38, 37]. Some of the ideas from these movements can be traced through into wider no-input mixer usage, particularly an anti-virtuosity stance, a push back against the need for improvising players to immediately react to each other, and to be able to slow down and stick with particular sounds or behaviours for longer durations. These ideas map to some other areas of practice where no-input mixers might be used, even where there is quite a different underlying aesthetic, such as drone, noise and power electronics. A common theme across the participant interviews was a view of the mixer as being well suited to what might be called a "let it be" approach to playing: the performer is a listener as much as a player, in part due to the difficulty in predicting the outcome of any of their own actions.

Improvisation therefore usually plays a key part in working with the mixer. The generally unruly and unpredictable nature of the instrument seems well suited to situations where the performer is able to embrace unexpected sonic changes. For several participants the mixer was a route into playing with others that wasn't so straightforward with their other musical tools, and therefore for being a closer part of improvised musical communities. The mixer was discussed as supporting an immediate, instrument-like relationship, analogous to acoustic instruments ("[no-input mixer] felt as close to an acoustic instrument as electronic instruments could get", Adam Saikelay).

Solo performances were often framed as being slightly less freely improvised: participants might arrive with a particular starting point (usually a particular mixer patching setup) and perhaps a few ideas for how to proceed initially. Within this however, most participants were open to sub-

stantial diversions as the mixer responded in different ways and took the performance in unexpected directions.

Despite the pull of improvisation with the mixer, it has found a place in composition, perhaps most notably in Marko Ciciliani's *Mask* [7], a piece well known to many of the other participants. Ciciliani used "sounds I can more or less reproduce identically" for the piece. Reflecting on the piece, Ciciliani suggests the "sonic result was relatively poor, as the recreatable sounds were the least interesting".

Christian Carrière and Adam Saikaley have often taken a tuned, polyphonic approach to no input mixing that provides a notable contrast with most of the other artists interviewed for this study[4]. Carrière's practice has emerged in part from his background as a sound engineer, particularly for live television where there was already a focus on having to perform with the mixing desk. He tends to work with larger desks with high channel counts, where each channel is a distinct, pre-tuned note, and the desk functions more like an organ. The feedback loops are pre-fader, so that turning up and down the volume of each tone with the faders does not interfere with the carefully tuned pitches. The performable aspects are therefore almost entirely predictable.

Many of the artists interviewed have engaged with rhythmic music in various ways. This can bring the no-input mixer into connection with quite different areas of musical practice, such as minimal techno (latent in many of Nakamura's early recordings), dub, hip-hop and electronic pop. Knight's work has leant into the minimal techno aesthetic explicitly, taking advantage of the metronomic pulses that emerge from feedback paths that have the low frequencies significantly boosted. Grab's work with Yao Bobby explores aspects of dub and hip-hop. The duo have specific pieces that they recreate live and Grab has to be able to transition from track to track quickly and easily. One useful tool for this is having a control voltage sequencer that can be passed into the mixer, and that permits storing and recalling preset patterns. This allows Grab to instantly recall a particular pattern to be sent to the mixer, even if the way the pattern manifests is still reliant on him having to set aspects of the mixer manually.

Philip White's conceptual covers album with Ted Hearne, *R WE WHO R WE*, engages explicitly with popular music. Here, the mixer is used to present strange, decimated versions of popular songs, with the slick pop production replaced with the raw sound of the mixer. Two other direct engagements with pop music can be found firstly in Mike Dubue's work, using mixer feedback in live performances and studio recordings for his band Hilotrons, and secondly Trever Hagen's use of no-input mixer on Taylor Swift's *Closure*[5] [47]. In these examples, the mixer tends to play one small part amongst a richer arrangement.

Hagen's work for Swift in particular is perhaps more usefully thought of as a sound design approach to using the mixer, where the performable and behavioural aspects of the mixer are subordinate to the specific signification of the sound world. A range of no-input mixing sample packs—collections of pre-recorded audio files—have been released commercially[6]. The Glitchedtones pack suggests that the sounds could be useful for "situations where a character's hearing is impaired, for constructing glitching communications and old school computers loading or to heighten the tension in horror and science fiction scenes". This is an interesting context for no-input mixing as it removes the interactive dimension which was a big part of the appeal for most participants, retaining only the sounding output.

5. ERGODYNAMICS

Given the breadth of usage articulated above, we can begin to explore what Magnusson refers to as the *ergodynamics* of the instrument [23]. This term is used to connect together the material qualities of an instrument alongside an awareness for how the instrument integrates into musical contexts. It therefore blends objective analyses with subjective cultural perspectives, and so is always an analysis from one point of view, and is something that inevitably shifts over time.

While there are important continuities between all of the musical contexts described above, considering them one-by-one below provides a helpful way to connect together the music, the mixer and that specific musical context, even if this risks reductive chariacatures of the contexts.

5.1 Listening

The "let it be" attitude articulated above in Section 4 provides a starting point for this form of analysis. We can trace a clear connection between the properties of the material object—unpredictability, complex control, emergent behaviours—and particular artistic philosophies such as the tendency to remove or undermine composer agency, Lucier and others' approach to using scientific and acoustic test procedures as compositional material, anti-viruosity, letting processes unfold over time, or ideas from free improvisation about exploring an instrument as a performative event [1, 17]. Barrett suggests the no-input mixer can be conceived as "a physical embodiment of this kind of attitude" [2]. The mixer can transport this idea to some extent: artists who happen upon mixer feedback in their own experiments may find themselves encouraged to stand back and focus on listening and to take a more collaborative stance with their instrument, or to explore a freer approach to improvisation than they might have otherwise considered.

For Yan Jun, no input mixing is a way out from having to worry about being responsible musically for the result of his actions:

> The first thing is [...] it's not my responsibility. [...] if you play the guitar, you play it good or not good, it's your playing, it's your ability and it's your decisions. But if I play some feedback noise, it could be bad or terrible, but I just show this: how this sound, this terrible sound, is. I don't have any responsibility, it's not my creation. I think that's very important for me: to avoid this part. Because I was always very nervous on the stage. I was always trying to avoid this part of musicianship.

This presents a more extreme end of the spectrum where the feedback processes and their sounds are seen to pre-exist the performance, and the artist's responsibility is to show these processes, rather than necessarily perform them musically. Dino [16] and Nakamura [10]. have expressed similar sentiments.

5.2 Expression and the body

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[4]Described by Carrière in more detail in [5]

[5]although it is very difficult to hear the specific role played by the mixer in this recording

[6]See for example: Hand-Music (Sascha Bachmann) `https://hand-music.com/no-input-mixer-sample-pack/`, Waxlife and Bienoise (Simone Lanza and Alberto Ricca) `https://www.waxlifemusic.com/bundle/`, Glitchedtones (Stuart Keenan) `https://glitchedtones.com/products/high-frequency-feedback-loops`

It's important to note that this relationship to the instrument is not a deterministic or inevitable consequence of the material specifics, but a particular confluence of material and cultural factors. Several participants explicitly contrasted their approach to Nakamura's. Andrew Leslie Hooker places a greater emphasis on a more traditional idea of instrumental control, and a more dynamic, bodily kind of interaction with the mixer.

> [Nakamura's] approach is completely different from mine: whereas I like to actually play the instrument, he will say that he likes the instrument to play him. [...]

> [Nakamura] hardly moves, just his fingers. I'm all over the place, moving my hands, my arms, my head's moving, it's like I move with the sound of the mixer.

While a reductionist approach to improvisation might eschew any necessity for fast, reactive playing, this is a point of pride for Hooker, that he has refined his control of the mixer so that he can play in a responsive fashion:

> I've played it for so many years that I can control it [...] I have a large amount of control over the mixer. I've just done a session with a jazz guitarist and I pretty much managed to match him note for note

Mira Martin-Gray also contrasts her approach to Nakamura's, focusing on attitudes to expression:

> [Nakamura] has talked a lot about the music as non-expressive which is interesting, but very much the opposite of how I feel for my own music. I think that it's interesting that this weird instrument has both of those things inherent in it: you can make this totally austere, nongestural type of music, but you can also make the most emotional kind of music, or you can make 16kHz tones, or you can make totally bizarre babbling craziness. (Mira Martin-Gray)

Gray discusses self-expression in contrast to a detached Cagean rationality [14] which she associates with a pure, absolute music or sound that separates mind from body. She foregrounds a more corporeal approach to the mixer in her work, and has sometimes incorporated her own voice into her practice with the mixer.

5.3 Polyphonic no-input

The tuned, pitched, polyphonic approach described in Section 4 provides another contrasting perspective. When performing in this way, the unpredictable aspects are usually tamed to a large extent. A trait of the mixer that appears to appeal in this situation is the ability to carefully tune the mixer microtonally: both Carrière and Saikaley express a keen interest in working outside equal temperament. Approaching the mixing desk in this way presents a markedly different idiom: there is no longer the potential for significantly unexpected outcomes or the necessity for a "let it be" approach. Instead, harmonic relationships tend to come to the fore.

Carrière has performed Arvo Pärt's *Fratres* using this approach[7]. This was a project that several other participants had heard of, who often used it as a contrast with their

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[7]https://vimeo.com/30074885

own work, struggling to understand the rationale for using the no-input mixer in this context. Despite the controlled approach to pitch, Carrière still finds the volatility and visceral aspects of the mixer an appealing and more personal compared with commercial synthesisers or MIDI controllers.

5.4 Rawness

The *rawness* of the mixer was a common theme that emerged from participant interviews: that it gives a sense of being in direct connection with the electricity. This blended material-social aspect can be connected to several musical contexts.

Feedback is a typical tool of the trade [52, 39] in industrial noise or power electronics, and the no-input mixer's potential for abrasive distorted bass, piercing high frequencies, rhythmic pulses, and for signifying raw electricity seems well suited to the aesthetics of these contexts. The "let it be" attitude may be cast in a different light, re-framed as a human powerlessness in the face of powerful machines [39, p 179], and with the emergent dimension to the instrument's behaviour suiting an area of practice that is usually happy to embrace chaos and unpredictability [39, p 23][8].

The harshness of the sounds and the signification of raw electricity also appear to be an aspect of the instrument being taken up in sound design contexts. The Glitchedtones sample pack mentioned above suggests that "perhaps the navigational system is on the fritz while en route to Mars, or the radio has lost its signal while the hero is stranded in a dark forest".

The rawness presents itself in a different fashion in Knight's minimal techno explorations. Here, the pared-down clicks and tones fit neatly with the sparse aesthetic of minimal techno. The characteristically slow pace of change and development also seems to be a good fit for this way of working with the mixer: when working in this style as opposed to more of a free improvisation context, Knight is much more careful with any changes that are made, as the piece can be a complex balancing act of different interrelated parts.

6. CONCLUSIONS

The preceding section has explored the coming together of particular material features of the mixer with particular cultural practices and attitudes. This provides a relevant case study for NIME of the two-way interactions between musical ideas and musical technologies. We have seen how specific musical ideas can become associated with a technology, but also how these links are related to specific cultural perspectives rather than immutable facts. An initial attempt at engaging with a complex, messy history of the no-input mixer has been given in sections 2 and 4 in order to support these analyses. The affordability, accessibility, customisability, and ergomimetic dimensions were considered as factors in the spread of the mixer, and its migration into a variety of musical contexts.

7. ACKNOWLEDGMENTS

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[8]"Their electronic feedback embodies a human–machine relationship that is uncertain, excessive, and out of control"

Frans de Waard, Simon Weins, Philip White and Emilia Wysocka.

8. ETHICAL STANDARDS

Participants were contacted by mail prior to the interviews to give consent to participate in the study and to be recorded for later transcription and analysis, in conformity with the University of Edinburgh's Research Ethics Committee. Participants were sent the review copy of the manuscript to confirm and approve use of their non-anonymised quotes.

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