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Sense-sational acting: Intuition in actors is supported by interoceptive, exteroceptive, and immersive abilities

Abstract

Intuition has often been assumed to be an intangible process that is beyond an actor's control and influence. This paper puts forward an alternative perspective, proposing that intuition is best understood as an embodied cognitive process. We empirically explore this operationalisation within the acting context, and propose that intuition for actors can be developed. We hypothesised that (i) immersion and sensory awareness are the driving components of intuition in the process of acting; (ii) there would be individual differences in these mechanisms, and (iii) these mechanisms can be practiced, developed, and trained. We tested these hypotheses through a series of multi-methodological studies: Study 1, a large-scale survey with actors of all levels (n=310), Study 2, a large experimental study with psychology students (n=198), and Study 3, a longitudinal and experimental feasibility study involving a newly developed training method for acting students (n=20). The results demonstrated that trait absorption and exteroceptive awareness predicted the participants' intuition, and that individual differences in trait awareness and immersion were associated with concurrent differences in tasks assessing intuition and intuition mechanisms. We moreover found that these skills may be developable and trainable: Intuition scores were greater in actors with greater practice (Study 1), in acting students than psychology students (Study 2), and increased as a result of the training method focused on attention and awareness (Study 3). We conclude that in the context of acting, intuition is supported by trainable abilities for awareness and immersion.

Keywords: Acting; intuition; awareness; absorption; imagination

Actors who have experienced the feeling of ‘being in the zone’ or being led by their ‘guts’ may be able to attest to the heightened experience it creates, captivating their co-actors and audience with their performance. This demonstrates the power of *intuition*, which is considered to be the driving force behind Konstantin Stanislavski’s approach to acting training (Stanislavski, 2001, 2008), which remains the foundation of Western mainstream acting (Conroy, 2010; Evans, 2019; Merlin, 2014). Nevertheless, Stanislavski has stated that intuition may be something “rare, accidental, and [which] did not last” (Stanislavski, 2001, p. 171). If intuition is indeed as intangible and fleeting as this quote of Stanislavski suggests, that would be unfortunate, considering the importance placed on achieving top performances driven by these states (Jackson & Roberts, 1992), for example through their impact on the audience’s appreciation or the performer’s career. Thus, we suggest that it is important to delve deeper into the nature of an actor’s intuitive state, explore the underlying mechanisms that support it, and consider whether it can be actively practiced, trained, or developed.

We propose that intuition can be conceptualised as an embodied cognitive state (i.e., a state of mind) occurring when an individual (i) has exteroceptive and interoceptive awareness of sensory inputs and outputs that transpire during a task, but simultaneously (ii) can remain fully immersed in a task through focused attention (see also, de Wet, 2020, 2023). Thus we suggest that intuition is supported by the cognitive mechanisms of *awareness* and *immersive attention*. This operationalisation is distinct from that of intuition in the broader psychology literature, where it is commonly thought of as a cognitive process of decision-making, resulting in, for example, an intuition rising in response to a particular problem or task (Pretz, 2008; Seligman & Kahana, 2009). Nonetheless, our conceptualisation of intuition has other analogues in the psychology literature, such as the concept of flow (Csikszentmihalyi, 1996), which has previously been linked to acting performance (Alfreds, 2007; Robb & Davies, 2015; Silberschatz, 2013); we will address similarities and dissimilarities here.

In this paper, we will explore and elucidate our operationalisation of acting intuition, the roles that different cognitive mechanisms play in intuition as we define and employ it, including *interoception* (i.e., the awareness and feeling of interior sensations), *exteroception* (i.e., the awareness and sensation of the environment exterior to the body), and *absorption* (i.e., total, focused immersion). Further, we will investigate individual differences in these cognitive mechanisms, and their developability through an acting training programme in a feasibility study.

Acting intuition

Acting involves the translation of a fictional environment into a live, uncontrolled environment. Acting is about taking a world from a page and enacting it on a stage or set. Practically, this means that an actor needs to draw on their imaginings in an embodied way over a sustained period of time (i.e., in a take, rehearsal, or a performance) in order to sustain the world of make-believe for their viewer or audience too. When an actor enters a state of immersion (i.e., is absorbed) during an imagining, with full attention in and awareness of the imagining, but also of oneself and the environment, we say

that the actor is acting *intuitively* (de Wet, 2023). They engage with the performance *in the moment* whether in the middle of a performance or movement, and no matter the external context - whether co-actors are deviating from the script or there are technical difficulties –, but also pay close attention to their experiences, whether interoceptive signals or their current emotional connection with the character and performance. We define acting intuition as the ability to attune to the affective states of oneself, another, and the environment through heightened perception and immersive attention.

To assess self-reported acting intuition, we designed questions to examine the actors' self-perceived intuitive ability and engagement in the acting context, and created a task involving different scenarios that may occur during acting performances that require decisions as to how to proceed. We moreover designed a psychological, experimental task of acting, which involved imagining acting out scenarios. This imagination task was adapted from a previous imagination study (van Mulukom et al., 2016) and a previous neuroscience of acting study (Brown et al., 2019), and involved participants imagining a number of open-ended scenarios. These scenarios came in three conditions: participants either imagined to be the character in the scenario as oneself, as one's best friend, and as a fictional person (Romeo or Juliet). Use of intuition in this task was assessed through several ratings of the imagining task related to the hypothesised cognitive mechanisms involved (e.g., immersion in the moment, in the story world, and in the story character, respectively); which allowed us to assess differences (e.g., between participants or changes over time).

An embodied cognitive state

Notably, intuition as operationalised here is not solely a cognitive phenomenon but is intricately connected to the body's engagement in the activity. The perception of intuition emerges from a physiological state where somatosensory signals, such as those related to interoception and exteroception, interact with motor commands (Cheron, 2016). The body's movements and actions become synchronised with the cognitive and emotional processes, creating a holistic experience of intuition. Hence, we consider intuition an *embodied* cognitive state.

In this sense, intuition is very similar to flow. Flow is an embodied cognitive state, which like intuition, is characterised by complete immersion and intense focus in an activity, but also one in which, unlike intuition, the person's actions are goal-oriented and the challenge of the task at hand matches one's skills, resulting in a harmonious and enjoyable experience (Csikszentmihalyi, 1996). Focusing first on the similarities; like intuition, flow is considered to be rare, elusive and unpredictable (Swann, 2016), but is also considered highly desirable for top performers such as athletes but also artists, due to the association between flow and peak performance (Chemi, 2016; Jackson & Roberts, 1992).

Some main discrepancies between flow and intuition as operationalised here lie in the flow's reliance on goal-orientated and outcome-based behaviour, as opposed to the experiential nature of intuitive acting. In a flow state, the individual can fully focus on the task and feel in control, thereby

facilitating an attentional immersion in the task at hand in a pleasurable way. Intuition as we operationalise it here does not have the same goal-orientation or link to capabilities or challenge, however. Intuition is a consciously perceived embodied state where an actor can shift their awareness and attention from a narrative sense of self to an experiential sense of self (Farb et al., 2007). In other words, in an intuitive state, the actor is absorbed in the imaginary world and is experiencing it as though it is real for them while it transpires, enabling them to be responsive to the unfolding dynamics of the present moment. This conception of intuition as a total immersive and present state differs from a state of dual consciousness which is most often used by trained actors, in which the actor holds a dual awareness of both themselves as an actor and character (Merlin, 2016). When actors act intuitively, they become immersed *in* the awareness of experience rather than being aware of themselves having the experience as suggested by the dual consciousness stance.

Dual consciousness may work in relationship with flow, but whilst acting intuitively, the actor is better supported by employing ‘meta-awareness’, the explicit awareness of the contents of consciousness (Dunne et al., 2019). In the acting context, this is the process of being aware of the experience the actors are having, whilst simultaneously being absorbed in the experience (de Wet, 2023). By applying meta-awareness to become absorbed in a performance, intuition may become a sustained cognitive state, as the actor will then be able to facilitate an awareness of the experience *as they experience it* (de Wet, 2023); that is, the shift from a narrative sense of self to an experiential sense of self (Farb et al., 2007). This entails that the individual’s attention is primarily placed on having the experience, rather than on reflecting on the fact that they are having an experience. Here we argue that intuition may be preferable to dual consciousness in a flow state (though see Goldstein, 2018 for caveats on this), where an actor maintains an awareness of themselves as both character and as the actor, because this may leave an actor susceptible to self-consciousness (de Wet, 2023), which in turn may hinder the performance (Cappuccio, 2017).

Here a link between acting intuition and mindfulness practices becomes clear: mindfulness practice involves striving for sustained self-awareness, whereas flow involves losing oneself within activity (Sheldon et al., 2015). Indeed, meta-awareness is recognised as a pivotal component of most mindfulness practices (Dunne et al., 2019). Thus we suggest that mindfulness practices and acting practices use a similar mechanism to bring awareness to the body and environment and therefore to reach an intuitive cognitive state. Therefore, we hypothesise that practiced meditators and mindfulness experts may be better at entering the cognitive state of intuition while acting (see also Middleton, 2017; Middleton & Núñez, 2018).

Psychological mechanisms: Awareness & Immersion

When the actor becomes absorbed in the experience as it unfolds and then responds to novel sensory cues attending to these cues as they are immediately and dynamically arising in that environment, we say that the actor is using their intuition. Thus, intuition requires a combination of awareness and

immersion. More specifically we suggest that the ability to act intuitively is made possible when an agent engages in *exteroception* (sensory information that is received from outside the body) and is attentive within their environment, the specific and changing conditions of which furthermore stimulate *interoceptive* sensations (awareness and feeling of interior sensations), which the agent attunes to too. That is to say, the actor's ability to be simultaneously aware of how their exteroceptive actions are impacted and impacting the environment continues to influence interoceptive sensation.

Besides natural variation in individual differences in these perceptive skills, these abilities may also be the result of practice and training. For example, certain types of meditation, such as mindfulness meditation, are aimed at increasing awareness of one's body and surroundings (Baer et al., 2006; Kabat-Zinn, 2003): both exteroceptive and interoceptive awareness are fundamental to in maintaining a 'present moment' focus of mindfulness (Brown & Ryan, 2003). Engaging in the practice of meditation may therefore result in changes in these abilities. By attuning individuals to outcomes of the non-conscious system of processing (such as through interoception), mindfulness may enhance the extent to which individuals attend to their intuitions (Dane, 2011).

How might we measure awareness in acting? Established intuition measures often are self-reported *trait* measures of how intuitive people perceive themselves to be (Pacini & Epstein, 1999). Attempting to study intuition through *state* measures are less common, because measuring intuition behaviourally is notoriously difficult as it is regarded to be an automatic, fast, and non-conscious process (Evans, 2008; Stanovich & West, 2000). We therefore opted to measure state *awareness* as an experimental measure of intuition. In order to measure this, we developed a task based on mindfulness research that asks the participant to be with their own awareness for one minute, after which they complete a state awareness survey measure (Tanay & Bernstein, 2013), with items reflecting both exteroceptive and interoceptive awareness.

Intuition is centrally supported by exteroceptive and interoceptive awareness; mechanisms which, when fine-tuned, allow individuals to process sensory inputs intuitively while staying immersed in a task. The ability to immerse oneself fully may be captured by *absorption* – the capacity for hyper-focus, attentional commitment, and imaginative involvement, expressed in periods of complete focus that fully engage one's perceptual, enactive, and imaginative capabilities (Tellegen & Atkinson, 1974). Absorption has previously been demonstrated to be higher in acting students than in music and non-arts students (Panero et al., 2016), and we suggest that a predisposition for absorption allows for intuition - through its engagement and integration of multiple perceptual, motoric and imaginative processes (Panero, 2019). Given the focus of immersion on hyper-focus in both the absorption and flow literature, it may be that awareness is *required* for immersion; though an in-depth investigation is beyond the scope of this article, we will explore this possibility.

We compiled several measures through which we could assess immersive cognitive states associated during intuitive acting imagination: immersion into the imagined scene and a sense of becoming one with the character the participants imagine. First, we will use the flow state scale to

measure focused immersion into the moment and activity (imagining). Despite some differences between our conceptualisation of intuition and flow (as described above), there are important overlaps in focused immersion and the positive outcomes of that immersion (i.e., a heightened experience). Immersion into the character's psychophysical construction is another core component of acting (Gillett, 2007; Merlin, 2014; Stanislavski, 2008). Story world absorption (Kuijpers et al., 2014) directly examines this process, which is comprised of items assessing aspects of attention, emotional engagement, feelings of transportation, and mental imagery. To further assess the process of immersing into, and becoming one with, the imagined character, we also created a measure of 'character fusion' by adapting a pictorial measure of identity fusion (Swann et al., 2009).

Acting intuition training

Many current acting training methods modelled in the Stanislavskian style typically focus on (i) developing proprioceptive awareness (i.e., the awareness of skeletal-muscular movement), rather than exteroceptive or interoceptive awareness specifically (Feldenkrais, 2010; McCaw, 2020); and (ii) assisting actors in being able to portray characters and a story world (i.e., script) in a realistic way, rather than an immersion into the story (Chekhov, 1985; Gillett, 2007; Meisner & Longwell, 1987; Merlin, 2014; Rushe, 2019; Stanislavski, 2008). This approach to acting training in Western practice is aimed at teaching actors to play characters in a realistic manner by portraying the emotions, desires, and drives of a character (Alfreds, 2007; Merlin, 2014; Mirodan, 2018; Roach, 1993).

Here we have designed an acting training method to develop intuition as we define it and tested it in the present research. This training method differs from some other, existing styles of acting training in that it was created as a method to specifically develop intuition as an embodied cognitive state, rather than on offering techniques and explorations which focused on character, vocal, or physical development, as for example Stanislavski's systematic approach and other wider training regimes may offer actors (though we concur that these types of practices may also indirectly contribute to acting intuition). The exercises were designed with the intention of increasing the actor's interoceptive and exteroceptive awareness, since we propose that this will enhance the actor's ability to become attuned to their environment and therein impact the immersive experience.

In order to develop intuition as an embodied cognitive state involving interoceptive and exteroceptive awareness, the new training method consisted of (1) exercises focused on mental and motor imagery that were structured by using guided meditations to train the actor's attention and sensory awareness (Blakeslee & Blakeslee, 2009; Eddy, 2016; Slagter et al., 2007), which aimed to facilitate a connection between interoceptive and exteroceptive awareness and action through a sensorial, imaginative exploration, (2) the application of play as a psychosomatic tool (Evans, 2019; Marks-Tarlow, 2014) which aimed to develop an immersion into the story world through imaginative exploration and the interoceptive/exteroceptive dynamic that works between feeling and response, and (3) a somatic development of biofeedback (Ma-Kellams, 2014; Nagatomo, 1992), which aimed to

develop interoceptive awareness and autonomy over interoceptive processes through attentional focus exercises, which then aided the relationship between interoceptive feeling and exteroceptive action.

The present studies

Summarising, the aim of the present research was to investigate the psychological processes underlying intuition in the context of acting. Specifically, we hypothesised that (1) the capacity for absorption and exteroceptive and interoceptive awareness together underlie intuition in actors; (2) there are individual differences in these psychological capacities, and (3) these capacities can be, practiced, developed, and trained. We tested our hypotheses through a number of measurements (see Figure 1) in three studies (see Table 1): Study 1 is a large-scale survey with actors of all levels (n=310) and aims to elucidate the relationships between acting intuition, proposed underlying mechanisms, and individual differences (including through previous experiences and practice); Study 2 comprises a large experimental study with psychology students (n=198) and aims to test and examine newly designed task measures of acting intuition based on imagination and awareness, and to provide a possibility of comparison between psychology students and acting students; and Study 3 is an experimental longitudinal study involving a training method for acting students (n=20) and aims to test the effect of a newly developed acting intuition training on acting intuition as measured through the developed imagination and awareness tasks.

Figure 1

Overview of acting intuition, its cognitive mechanisms, and how we measured them through psychological survey and task measures, including acting-specific practice and non-acting-specific practice

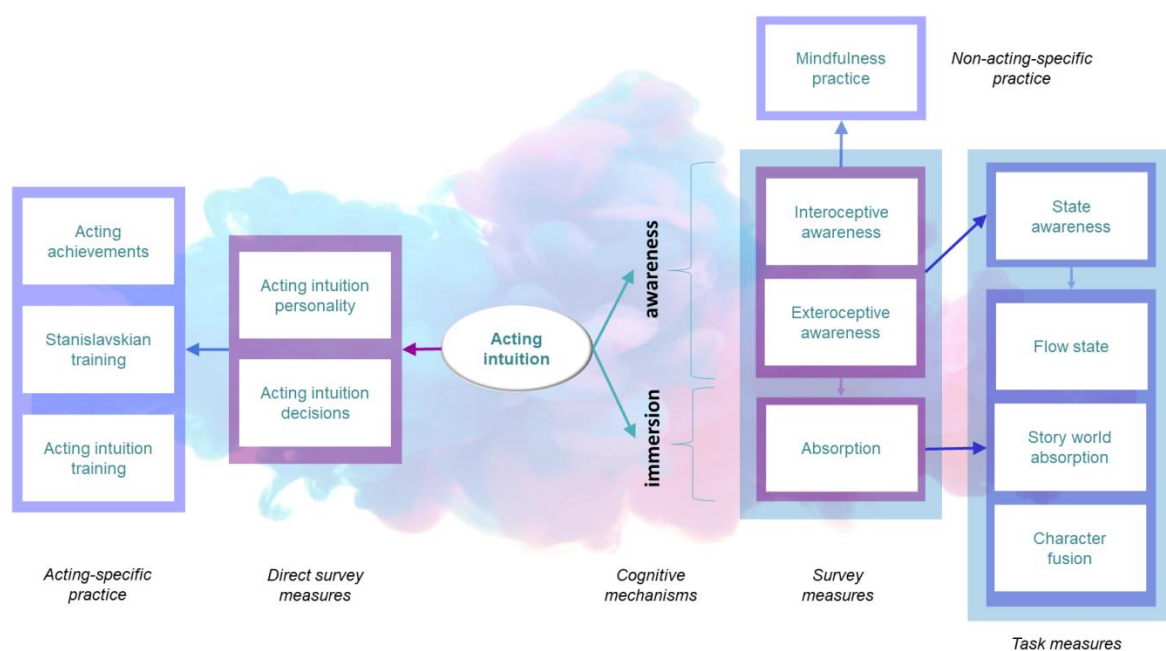


Table 1*Overview of the three studies, their research design and components*

Study feature	Study 1	Study 2	Study 3
<i>Type of study</i>			
Research design	Survey	Experiment	Experiment
Participants	Actors of all levels	Psychology students	Acting students
Analyses	Cross-sectional	Cross-sectional and experimental	Cross-sectional, experimental, and longitudinal
<i>Psychological survey measures</i>			
Acting intuition: Personality	✓		✓
Acting intuition: Decisions	✓		✓
<i>Cognitive mechanism survey (trait) measures</i>			
Awareness: Interoception	✓	✓	✓
Awareness: Exteroception	✓	✓	✓
Immersion: Absorption	✓	✓	✓
<i>Acting-specific practice measures</i>			
Acting achievements	✓		✓
Stanislavskian training	✓		✓
Acting intuition training			✓
<i>Non-acting-specific practice measures</i>			
Mindfulness practice	✓	✓	✓
<i>Psychological task (state) measures</i>			
Awareness: State awareness		✓	✓
Immersion: Flow state		✓	✓

Immersion: Story world absorption	✓	✓
Immersion: Character fusion	✓	✓

Study 1

Introduction

In Study 1, we sought out to develop and test new survey measures of intuition to explore the connections between immersion (i.e., absorption) and awareness (i.e., exteroception and interoception); to examine how these processes may support intuition in acting; and how they may differ between individuals with different backgrounds (i.e., career stage, Stanislavskian-based training, and mindfulness practice). We hypothesised that the awareness and immersive processes would be interrelated, and that individuals with higher levels of intuition in acting would score higher on exteroception, interoception and absorption, as the hypothesised mechanisms underlying acting intuition. In line with this hypothesis, we expected individuals with greater practice, such as those further in their career stage (i.e., professional and recognised actors), with a Stanislavskian-based training background, and with frequent interoceptive and exteroceptive awareness practice (as measured by mindfulness), to also score higher on acting intuition measures. We suggest this may be the case because each of these backgrounds can involve practices that may have indirectly increased exteroception, interoception and absorption. In order to test these hypotheses, we developed new tools to measure acting intuition: we adapted the Rational-Experiential Inventory (Pacini & Epstein, 1999) to reflect intuitive personalities in the context of acting, and we adapted the Ambiguous Decisions task (van Mulukom et al., 2023) to reflect intuitive decisions in the context of acting.

What do intuitive decisions in the acting context look like? Based on our previous research (van Mulukom et al., 2023), we have distinguished a number of scenarios in which intuition may be discerned in acting, namely through the interpretation of interoceptive signals, strategies to become emotionally connected, engaging in specific aspects of acting, and strategies for unexpected developments. For instance, it may be considered intuitive acting (i) when actors interpret interoceptive signals such as getting butterflies or feeling that they are glowing as a positive engagement with the performance, rather than a sign of nerves; (ii) when actors are not emotionally connecting with the performance, so they turn their attention to how they feel in the moment, rather than recalling and implementing techniques; (iii) when actors are in the middle of a dialogue or movement action and they interpret the text or way it is said, or the way and direction of the movements of the actors, *in the moment*, instead of listening to the text of the actors knowing what their next lines are, or anticipate that the other actors will walk in a way and to the location as they were instructed to; (iv) when actors are in a performance and something unexpected happens, like a

co-actor does something that was not planned in the rehearsal or there are technical difficulties, and the actors go with where the moment leads and adapt to the situation, rather than trying to steer the co-actors back on course through strategies or trying to control the situation.

Methods and materials

Participants

The online survey was advertised specifically towards actors and acting students on the (UK-based) Standing Conference of University Drama Departments (SCUDD) mailing list, social media, and several relevant acting subreddits on Reddit. Three hundred and ten individuals completed the online survey. Of the 310 participants, 161 female (51.9%), 142 male (45.8%) and 7 other/non-binary (2.3%) participants. Age ranged from 18-77, with $M = 31.2$, $SD = 12.6$ years old. Most participants currently reside in the United States ($n=165$, 53.2%); United Kingdom ($n=76$, 24.5%); Canada ($n=22$, 7.1%); South Africa ($n=15$; 4.8%). Remaining 32 participants are from 22 countries with 6 participants (1.9%) each or fewer.

Around a third of the participants ($n=127$, 31.7%) was a theatre studies or acting student at the time of the survey. On average, participants indicated to are studying/have studied theatre and/or film for 5.8 years ($SD = 7.9$), with a range from 0-70 years. The incongruence between the mean and the range suggests that people understood this question differently. As the question of years studying was meant to reflect formal education (including through workshops), not personally studying and engaging with acting, outliers which were more than two standard deviations from the mean were removed for analyses involving years of training. This resulted in the omission this data for 15 participants for a final mean of 5.0 years ($SD = 4.6$) and a range of 0-21 years. The participants had a wide variety in training backgrounds, such as courses and workshops on acting training, somatic and physical work, and vocal and body work. Here, we will focus in particular on whether the participant indicated to have done training in Stanislavskian approaches ($n=207$, 66.8%), or not ($n=103$, 33.2%), which the participants were asked through the question: “Have you taken any courses / workshops on acting training with Stanislavskian approaches (including more recent contemporaries such as Phillip Zarrilli, Mike Alfreds, Bella Merlin, John Gillett, Stella Adler, Jeremy Whelan, etc.)?”.

We adapted the theatre subscale of the Creative Achievement Questionnaire (Carson et al., 2005) to assess the acting and/or theatre background of the participants. Participants could click multiple options that applied to them: (1) “I do not have formal training in theatre or film” ($n=93$, 23.2%); (2) “I have amateur performance experience in theatre or film” ($n=257$, 64.1%); (3) “I have professional performance experience in theatre or film” ($n=234$, 58.4%); (4) “I have directed or produced one or many professional theatre or film productions” ($n=87$, 21.7%); (5) “I have won an award or prize for acting in theatre or film” ($n=87$, 21.7%); (6) “I have been paid to act in theatre or film” ($n=253$, 63.1%); (7) “I have directed or produced one or many amateur theatre or film productions” ($n=134$, 33.4%); (8) “My performance work has been recognised in national or

international publications” (n=63, 15.7%). On the basis of which options participants ticked the most, with the exception of item 4 and 7, which are about directing rather than acting, we created three groups of participants: ‘Amateur’ actors (options 1, 2; n=123, 31.2%), ‘Professional’ actors (options 3, 6; n=196, 49.7% and ‘Recognised’ actors (options 5, 8; n=73, 18.5%). Whenever participants ticked the same items for the groups, we counted the sum of Recognised (especially item 8) > Professional > Amateur items. Two participants did not tick any options (n=2, 0.5%).

Procedure

Participants first read the information sheet and then completed an online consent form before participating in the online survey. Participants were not reimbursed for their participation, but several analytical and intuitive scores were returned to them at the end of the survey as a reward for their time. Ethics approval for this study was obtained from the University’s Ethics Committee prior to data collection (P109895).

Scales

For full reliability scores (both Cronbach’s α and McDonald’s ω), see Table SM1.1.

Absorption. We measured absorption with the Tellegen Absorption Scale (Tellegen & Atkinson, 1974). Absorption is typically considered personality trait which includes a broad range of processes including hyper-focus, attentional commitment, and imaginative involvement. Absorption was measured through 34 items ($\alpha = .932$); an example item is “While watching a movie, a TV show, or a play, I may become so involved that I may forget about myself and my surroundings and experience the story as if it were real and as if I were taking part in it”. These items were rated on a 5-point scale with the options ‘Never’ (0), ‘At least once’ (1), ‘Occasionally’ (2), ‘Often’ (3), ‘Very often’ (4).

Exteroceptive awareness. To measure external sensory awareness, we used the Observing subscale of the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006), with 8 items such as “I notice smells and aromas of things”. One item of the original scale was not included - “I pay attention to how my emotions affect my thoughts and behaviour” - as it does not pertain directly to exteroceptive awareness. Participants were asked to indicate their agreement with each of the 8 items on a 5-point Likert scale, from ‘Strongly disagree’ (-2) to ‘Strongly agree’ (2). This scale had good reliability, $\alpha = .805$.

Interoceptive awareness. We used the Body Perception Questionnaire-Short Form (BPQ-SF; Cabrera et al., 2018) to measure the participants’ internal sensory awareness or perception of their body, as a self-report version of interoception. Participants were asked to indicate how often they notice twelve different bodily sensations (e.g., goose bumps, how fast you are breathing) on a 5-point scale with the options ‘Never’ (0), ‘Occasionally’ (1), ‘Sometimes’ (2), ‘Usually’ (3), or ‘Always’ (4).

Intuitive (everyday) personality. We used the Rational-Experiential Inventory (REI; Pacini & Epstein, 1999) to assess intuitive personality traits. We selected four items from the Experientiality scale to measure intuitive personality (Cronbach's $\alpha = .703$). This scale can be further divided into two items measuring Experiential Ability (Cronbach's $\alpha = .677$), through items such as "Using my gut feelings usually works well for me in figuring out problems in my life" and two items measuring Experiential Engagement (Cronbach's $\alpha = .428$) through items such as "I often go by my instincts when deciding on a course of action". Given that the low reliability of these subscales however, we only used the overall scale (i.e., the average of all four items). Participants rated their agreement on a 5-point Likert scale, from 'Strongly disagree' (-2) to 'Strongly agree' (2). The survey also included adapted Rationality items (i.e., analytical thinking), but these items will not be analysed here.

Intuitive acting personality. We adapted the selected REI items (Pacini & Epstein, 1999) that we used (see above) to refer specifically to *acting* (4 items). For example, "Using my gut feelings usually works well for me when acting." ($\alpha = .751$)(see SM.2 for all items). On the basis of their origin, these subscales could be further categorized as intuitive ability ($\alpha = .626$), intuitive engagement ($\alpha = .489$), but this demonstrated low reliability, so we will use the overall average of all four items in the analyses instead. Participants rated their agreement on a 5-point Likert scale, from 'Strongly disagree' (-2) to 'Strongly agree' (2). The survey also included adapted Rationality items (i.e., analytical thinking), but these items will not be analysed here.

Intuitive decisions (general & acting). We used the Ambiguous Decisions task (van Mulukom et al., 2023) to measure intuitive and analytical decisions in a variety of scenarios. The Ambiguous Decisions task was particularly suitable as it involves a variety of scenarios rather than questions about one's personality, and it allows for answers with no assumption of a hydraulic function between analytical and intuitive thinking. Using this paradigm and its format, we created four new scenarios directly pertaining to the acting context (see the introduction of this study for the type of scenarios and Table SM2.2.1 for the items). These scenarios were created from scratch through a collaboration between a research psychologist (of imagination) and actor/director (who at the time was studying for their doctoral degree in theatre studies). Four everyday scenarios and the four newly developed acting scenarios were presented to the participants, and they were asked to indicate how much they would rely on analytical and intuitive thinking for each scenario, on a scale from 0 ("Not at all") to 100 ("Completely"; no further anchors given besides score numbers at 10 point intervals, e.g., 0 10 20, etc.). Note that choices for analytical and intuitive thinking could be made independently from each other. One scenario of the acting decisions ("When you're about to go on stage, and you get butterflies.") was removed from the final scores, as it reduced the reliability of the measurement significantly, and the acting decisions were averaged over the remaining three scenarios. Only the intuitive scores were entered into the analyses as we did not have hypotheses regarding the analytical scores, but included these to give participants both options simultaneously.

Meditation. Participants were asked how often they engaged in meditation, with the seven options: (0) “Never, practically never”; (1) “Less often than once a year”; (2) “Once a year”; (3) “Only on special days”; (4) “Only when attending services / sessions”; (5) “Several times each week”; (6) “Once a day”; (7) “Several times a day”.

Mindfulness. The participants were asked to define themselves with regards to mindfulness, through six options: (1) “I do not engage in mindfulness and am not (particularly) interested in it”; (2) “I do not engage in mindfulness but am interested in it”; (3) “I have read about mindfulness and have occasionally done mindfulness exercise”; (4) “I have read about mindfulness and I practice mindfulness frequently”; (5) “I have attended mindfulness classes/courses and I practice mindfulness frequently”; (6) “I have attended mindfulness classes/courses and I practice mindfulness as often as I can”. From these options, we created four groups: the ‘no mindfulness’ group (option 1 and 2; $n=99$), ‘occasional mindfulness’ (option 3; $n=169$); ‘engaged mindfulness’ (option 4; $n=75$), and ‘very engaged mindfulness’ (options 5 & 6; $n=47$). As a control measure, we compared the mindfulness groups for frequency of meditation practice and found they differed significantly ($\chi^2(21, N = 387) = 192.60, p < .001$), with more frequent meditation practice corresponding to mindfulness engagement: ‘no mindfulness’ ($M = 1.31, SD = 1.72$), ‘occasional mindfulness’ ($M = 2.59, SD = 1.84$); ‘engaged mindfulness’ ($M = 3.96, SD = 1.84$), and ‘very engaged mindfulness’ ($M = 5.11, SD = 1.48$).

Results

First, we examined our main variables of interest descriptively and created a correlation table, see Table 2. We were particularly interested in what correlates with intuitive acting personality, and found this to be general intuitive personalities, absorption, internal and external sensory awareness, intuitive decisions both in everyday life and acting. Taking intuitive decisions in acting was positively correlated with taking intuitive decisions in everyday life, as well as a general intuitive personality, absorption, internal and external sensory awareness, and negatively correlated with taking analytical decisions in acting. See SM.2 for an in-depth discussion of correlations between absorption, exteroception, and interoception and intuitive acting personality and decision items.

Table 2

Means (M), standard deviations (SD), and correlations with confidence intervals of Study 1 variables

Variable	M	SD	1	2	3	4	5	6
1. Absorption	2.28	0.66						
2. Exteroceptive awareness	1.02	0.63	.60** [.53, .67]					
3. Interoceptive awareness	2.28	0.86	.41** [.31, .50]	.40** [.30, .49]				

4. Everyday intuitive decisions	62.41	18.45	.18** [.07, .29]	.16** [.05, .27]	.12* [.00, .22]			
5. Acting intuitive decisions	56.24	12.62	.22** [.12, .33]	.14* [.03, .25]	.16** [.05, .27]	.32** [.22, .42]		
6. Everyday intuitive personality	0.90	0.60	.40** [.30, .49]	.26** [.15, .35]	.11* [.00, .22]	.26** [.16, .36]	.20** [.09, .31]	
7. Acting intuitive personality	1.15	0.58	.33** [.23, .43]	.17** [.06, .27]	.16** [.05, .26]	.27** [.16, .37]	.51** [.42, .59]	.43** [.33, .52]

Note. Absorption and interoceptive awareness on a scale from 0-4, exteroceptive awareness and everyday and acting intuitive personality on a scale from -2 to 2, everyday and acting intuitive decisions on a scale from 0-100. Values in square brackets indicate the 95% confidence interval for each correlation. * indicates $p < .05$. ** indicates $p < .01$.

Practice: Acting background

Next, we investigated how these measures might differ between the four participant groups, and found that the four groups differed significantly in terms of intuitive acting personality and intuitive acting decisions, but not on other variables; see Table 3. The effect of intuitive acting personality differences was driven by amateur actors, who scored significantly lower than professional actors ($p = .001$) and recognised actors ($p = .001$), with a trend for a difference with acting students ($p = .065$); the other participant groups did not differ significantly from each other. The effect of intuitive acting decisions differences was also driven by amateur actors who scored significantly lower than professional actors ($p = .005$), recognised actors ($p = .003$) and acting students ($p = .03$).

Table 3

Means (and standard deviations) for four participant groups of Study 1 and comparisons between them

	amateur actors	acting students	profession- nal actors	recognised actors	Statistics
<i>Measures</i>	n=52	n=92	n=112	n=47	
Absorption (range 0-4)	2.32 (0.72)	2.32 (0.65)	2.27 (0.63)	2.39 (0.70)	$F(3,302) = 0.46, p = .71, \eta_p^2 = .005$
Exteroceptive awareness (range -2 to 2)	1.00 (0.71)	0.97 (0.58)	1.02 (0.63)	1.15 (0.56)	$F(3,306) = 0.90, p = .44, \eta_p^2 = .009$

Interceptive awareness (range 0-4)	2.21 (0.84)	2.16 (0.84)	2.38 (0.84)	2.45 (0.92)	$F(3,306) = 1.54, p = .20, \eta_p^2 = .015$
Everyday intuitive personality (range -2 to 2)	0.76 (0.57)	0.89 (0.64)	0.93 (0.60)	0.99 (0.60)	$F(3,306) = 1.48, p = .22, \eta_p^2 = .014$
Everyday intuitive decisions (range 0-100)	61.26 (15.94)	61.02 (17.75)	61.87 (19.63)	66.90 (18.14)	$F(3,306) = 1.60, p = .19, \eta_p^2 = .015$
Acting intuitive personality (range -2 to 2)	0.87 (0.60)	1.13 (0.64)	1.23 (0.50)	1.29 (0.46)	$F(3,303) = 6.48, p < .001, \eta_p^2 = .060$
Acting intuitive decisions (range 0-100)	50.55 (14.08)	56.54 (13.19)	57.56 (11.41)	59.21 (10.69)	$F(3, 306) = 4.72, p = .003, \eta_p^2 = .044$

Practice: Stanislavskian-based training

We investigated whether Stanislavskian-based training had a significant effect on intuitive acting (personality and decisions). We found that participants who had received Stanislavskian-based training ($n=191$) have studied acting ($M = 5.7, SD = 4.4$ years) significantly longer than those who have not ($n=101; M = 3.8, SD = 4.8$ years; $F(1,290)=11.44, p < .001, \eta_p^2 = .038$); for this reason, we will include years of studying acting as a covariate in following analyses.

An ANOVA demonstrated that, when accounting for years studying acting, those who had had a Stanislavskian-based training did not differ on the intuitive acting personality measure ($M = 1.17, SD = 0.57$) as compared to those without this training ($M = 1.08, SD = 0.60; F(1,286) = 0.33, p = .56, \eta_p^2 = .001$). Another ANOVA did indicate however that, when accounting for years studying acting, those who had had a Stanislavskian-based training did have significantly higher scores on the intuitive acting decisions ($M = 57.04, SD = 12.41$) than those without the training ($M = 53.41, SD = 12.72; F(1,289) = 3.80, p = .05, \eta_p^2 = .013$). This suggests that Stanislavskian-based training influences one's acting decisions to be more intuitive, but does not change an individual's perception as to whether they are an intuitive actor or not.

Next, we examined whether completing Stanislavskian-based courses was associated with different levels of absorption or exteroceptive or interoceptive awareness by running a multivariate ANOVA. We found that there are no significant differences in absorption between people who have ($M = 2.32, SD = 0.67$) and who have not ($M = 2.27, SD = 0.66$) completed Stanislavskian-centred training ($F(1,287)= 0.07, p = .80, \eta_p^2 < .001$), nor in exteroceptive awareness (training $M = 1.02, SD = 0.58$, no training $M = 1.00, SD = 0.69, F(1,289) = .02, p = .90, \eta_p^2 < .001$), nor interoceptive awareness (training $M = 2.29, SD = 0.89$, no training $M = 2.29, SD = 0.76, F(1,289) = .06, p = .80, \eta_p^2 < .001$).

Practice: Mindfulness engagement

We next examined mindfulness, the second form of relevant practice we measured. We used multivariate ANOVAs which indicated that there are significant differences in absorption, exteroceptive, and interoceptive awareness between the mindfulness groups, with higher scores for the more engaged mindfulness practitioners, see Table 4. Similar differences are found for the intuitive acting measures, whereby more engaged mindfulness practitioners have significantly higher scores on both intuitive acting personality and decisions. Post-hoc pairwise comparisons indicate that these effects are driven by the no mindfulness group scoring significantly lower than the more engaged mindfulness groups (see Table SM3.1).

Our hypothesis was that mindfulness practitioner status would influence intuitive acting measures because mindfulness practice could increase exteroceptive and interoceptive awareness. To test this idea further, we next ran an ANOVA with exteroceptive and interoceptive awareness as covariates, to test whether intuitive acting personality and intuitive acting decisions still differed between the four mindfulness groups. We found that intuitive acting personality still differed between the four mindfulness groups ($p = .05$), but intuitive acting decisions no longer did (though there was a trend, $p = .07$), see Table 4.

Table 4

Means (standard deviations) of absorption, exteroception, and interoception between the four groups of mindfulness practitioners and comparisons between them

	No mindfulness (n=69)	Occasional mindfulness (n=130)	Engaged mindfulness (n=64)	Very engaged mindfulness (n=41)	<i>statistics</i>
<i>Absorption and awareness measures</i>					
Absorption (range 0-4)	2.00 (0.67)	2.22 (0.59)	2.49 (0.71)	2.71 (0.54)	$F(3,300)=13.73$, $p<.001$, $\eta_p^2=.121$
Exteroceptive awareness (range -2 to 2)	0.78 (0.72)	0.95 (0.55)	1.22 (0.56)	1.26 (0.63)	$F(3,300)=8.58$, $p<.001$, $\eta_p^2=.079$
Interoceptive awareness (range 0-4)	2.12 (0.82)	2.14 (0.87)	2.53 (0.84)	2.58 (0.74)	$F(3,300)=5.59$, $p=.001$, $\eta_p^2=.053$
<i>Intuitive acting measures</i>					
Intuitive acting personality (range -2 to 2)	0.96 (0.63)	1.17 (0.53)	1.13 (0.59)	1.34 (0.59)	$F(3,299)=3.83$, $p=.01$, $\eta_p^2=.038$
Intuitive acting	52.05	57.09	57.36	57.85	$F(3,299)=3.09$,

decisions (range 0-100)	(14.69)	(11.68)	(11.74)	(11.70)	$p=.03, \eta_p^2=.031$
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Covariates: Exteroceptive & interoceptive awareness

Intuitive acting personality (range -2 to 2)	1.00 (0.07)	1.19 (0.05)	1.12 (0.07)	1.29 (0.09)	$F(3,299)=2.67,$ $p=.05, \eta_p^2=.026$
Intuitive acting decisions (range 0-100)	52.84 (1.51)	57.57 (1.08)	57.21 (1.51)	57.01 (1.94)	$F(3,299)=2.36$ $p=.07, \eta_p^2=.023$

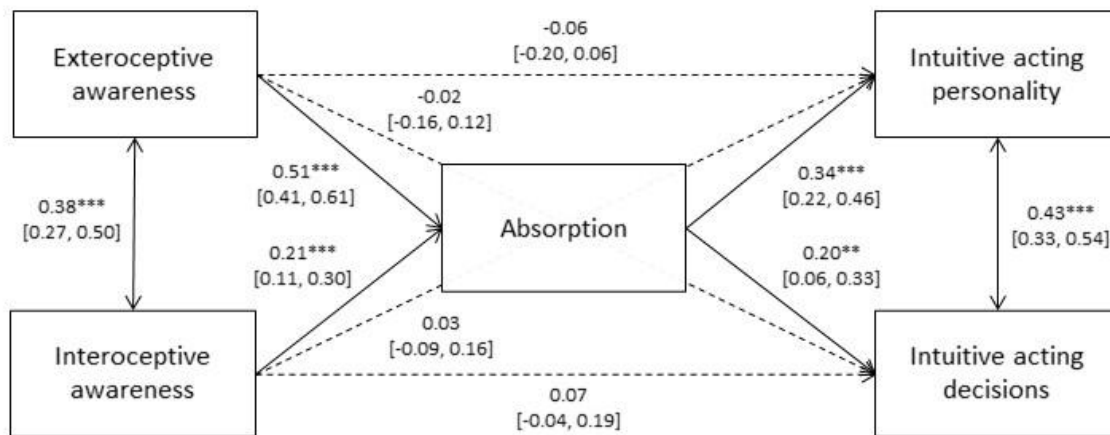
Note. Means reported (with standard deviations), and estimated marginal means (with standard errors) for the (bottom) ANOVA with covariates.

Predicting acting intuition

Finally, we ran an exploratory mediation model to examine interactions between exteroception, interoception, and absorption. More specifically, we modelled the possibility that exteroception and interoception are processes required for absorption, which in turn serves acting intuition, see Figure 2 (see Table SM4.1 for full statistics). When absorption is also included in the model, none of the direct paths from exteroceptive and interoceptive awareness to intuitive acting (personality and decisions) were significant (in contrast to the previously demonstrated small but significant correlations, see Table 1), but both exteroceptive and interoceptive awareness significantly predicted absorption, which in turn predicted intuitive acting (personality and decisions). All indirect paths were significant, from exteroceptive awareness via absorption to intuitive acting personality ($\beta = 0.17, p < .001$) and decisions ($\beta = 0.10, p = .004$), and from interoceptive awareness via absorption to intuitive acting personality ($\beta = 0.07, p = .002$) and decisions ($\beta = 0.04, p = .02$).

Figure 2

Mediation model, from sensory awareness to acting intuition measures via absorption (dotted lines are direct paths from predictor variables to outcome variables)



Discussion

Study 1 aimed to explore the relationship between absorption, exteroception, and interoception with intuitive acting (personality and decisions) and how certain practices could impact intuition or its components in acting, within a large sample of actors. We hypothesised that the actor's intuition, as measured by intuitive acting personality and intuitive acting decisions, would be supported by three cognitive capacities: exteroceptive awareness, interoceptive awareness, and absorption. We furthermore hypothesised that those with greater practice, such as professional and recognised actors, actors with Stanislavskian-based training, and actors engaged in frequent mindfulness practice, were likely to have greater intuition due to increased exteroceptive and interoceptive awareness.

Through a large survey with 310 acting students, amateur actors, professional actors and recognised actors, we validated our two newly developed measures of acting intuition - intuitive acting decisions and intuitive acting personality -, and found that these were positively and significantly correlated with the main hypothesised cognitive mechanisms (exteroceptive and interoceptive awareness, absorption), as expected. Moreover, in line with our hypotheses, professional and recognised actors scored higher on acting intuition (both intuitive acting decisions and personality) than amateur actors, but not higher than acting students (who also scored higher than amateur actors). The groups did not differ on other aspects like exteroceptive or interoceptive awareness, however. Those with a Stanislavskian-centred training scored higher on intuitive acting decisions but not intuitive acting personality or other measurements. Actors who reported that they are very engaged with mindfulness scored higher on both intuitive acting decisions and intuitive acting personality, as well as exteroceptive and interoceptive awareness and absorption, as predicted.

We hypothesised that mindfulness practice would contribute to higher acting intuition through increased exteroceptive and interoceptive awareness. Indeed, we found that if these variables were taken into account in the analysis, the difference in intuitive acting for the different mindfulness participant categories became smaller (intuitive acting personality) or insignificant (intuitive acting decisions). However, a residual effect suggests that mindfulness practice can have an effect beyond

exteroceptive and interoceptive awareness as it was measured in this study. An exploratory mediation analysis revealed that the effect of exteroceptive and interoceptive awareness on acting intuition (both personality and decisions) may work through absorption. In other words, higher exteroceptive and interoceptive awareness predicted greater absorption, which in turn predicted intuitive acting personality and decisions.

In sum, through this study we tested our new survey measures of acting intuition – intuitive personality and intuitive acting decisions – and found them to be of acceptable reliability and to show convergent validity (i.e., correlations with established measures of intuition). Intuition was positively influenced by the participants' history of practice: more advanced actors (actors who have had more training and experience), actors with Stanislavskian-based training, and those who engage frequently in mindfulness practice, all scored higher on acting intuition. Exploratory results demonstrated a role for exteroceptive and interoceptive awareness in absorption, which in turn supported acting intuition.

Study 2

Introduction

Having developed survey measures to assess our conception of intuition in acting in Study 1, and having investigated the roles absorption, exteroception, and interoception may play in intuition, we next set out, in Study 2, to combine these survey measures of dispositions associated with intuition in acting, with newly developed experimental task measures of awareness and imagination. We decided to test these novel measures on a large sample of non-actors in the first instance. Therefore, we included no measures of acting intuition (personality or decisions), but did include equivalents for everyday intuition (personality and decisions). We tested our new awareness task, based on mindfulness research, and imagination task, based on previous imagination research (van Mulukom et al., 2016) and a neuroscientific study of acting (Brown et al., 2019). In addition, we tested our new ratings, of state awareness (Tanay & Bernstein, 2013) for performance on the awareness task, and of flow state (Jackson & Marsh, 1996), story world absorption (Kuijpers et al., 2014), and character fusion (Swann et al., 2009), to measure performance on imagination task.

We hypothesised that the ratings on the state awareness scale would correlate highly with survey measures of exteroception and interoception, as in Study 1. We furthermore hypothesised another practice effect, whereby imagining ratings would be highest for the first-person condition of the imagination task, followed by the third-person condition, and lowest in the fictional-person condition, as we routinely imagine scenarios for ourselves (van Mulukom, 2013), and engage in Theory of Mind which involves a third person perspective (Harris, 2000), but non-actors do arguably not routinely imagine scenarios as a fictional persons. We also hypothesised that the imagining ratings would be highly correlated with trait absorption, given that they both measure ability for immersion. Given that Study 1 demonstrated that exteroceptive and interoceptive awareness may lead to

absorption (i.e., immersion) which in turn may lead to acting intuition, we further hypothesised that our Study 2 immersion measures would correlate with exteroceptive and interoceptive awareness. Finally, we note that since we tested these tasks and measures on a large group of psychology students, this provided us with a sample to later compare with the acting students of Study 3.

Methods and materials

Survey

For the survey, we used the same measures as Study 1 (see Study 1's Methods section above), with the exception of acting-related measures (e.g., intuitive acting decisions or intuitive acting personality) which were not included here as we were running this experiment on psychology students and not acting students. We again did not analyse measures which we had no hypotheses on (i.e., analytical measures). For reliability scores of this study and Study 3, see SM.7.

State awareness. We selected eight items the State Mindfulness Scale (SMS; Tanay & Bernstein, 2013) to measure state rather than trait exteroceptive and interoceptive awareness after the attention task. Examples of this scale are: "I felt closely connected to the present moment." and "I clearly physically felt what was going on in my body." (see Table SM5.1 for all items and the selection procedure). Participants answered the eight items with options from -2 ("Strongly disagree") to +2 ("Strongly agree").

Procedure

Ethics approval for this study was obtained from the University's Ethics Committee prior to data collection (P109895). Participants read an information sheet and completed an online consent form prior to taking part. Besides the survey, the participants completed two tasks, one aimed at measuring levels of awareness, the other aimed at measuring levels of immersion.

Awareness task. We developed an awareness task based on common meditation practices (Farias et al., 2021) to measure behaviour associated with exteroceptive and interoceptive awareness. This task supplemented our survey measures of the participants' perceived trait baselines of exteroceptive and interoceptive awareness. Participants were asked to focus their attention mindfully for one minute, after which they completed a measure of state awareness (rather than trait awareness). Participants were given the following instructions to read (see Figure SM5.1): "In this task, imagine a flame, dancing in the dark in front of your eyes. When you are ready, press play on the audio file below. A beep will sound. Please close your eyes and focus on imagining the flame until you hear the beep again (after 1 minute)."

Imagination task. We combined an imagination task developed by us previously (van Mulukom et al., 2016) with a task from neuroscience of acting research (Brown et al., 2019). In this task, participants were presented with hypothetical scenarios either as yourself (first-person condition), a friend of the same gender (third-person condition), or as Romeo or Juliet (fictional-

person condition). In the hypothetical scenarios, locations, and situations are matched, for example “Location: Parents’ kitchen” or “Location: A small, local restaurant”, and presented with a situation: “You just got fired from your job. How do you tell your parents?” or “A waiter starts a personal conversation. How do you respond?”. The participants are asked to imagine the scenario and to improvise a response for 30 seconds. For each condition, there are six trials (i.e., scenarios), presented in one block. After the participants had completed a block, they were asked to rate the block as a whole through three additional sets of ratings, aimed at capturing their immersion in the imagining.

Flow state. We selected five items from the Flow State Scale (Jackson & Marsh, 1996) to measure the mental flow state of participants for each of the blocks of scenarios that they imagined; more specifically, two from the Action-Awareness Merging subscale, one from Concentration on Task at Hand subscale, one from the Paradox of Control subscale, and one item from the Challenge-Skill Balance subscale, (see Table SM6.1 for a description of the selection process). These items were: “I felt just the right amount of challenge.”, “My thoughts/activities ran fluidly and smoothly.”, “I had no difficulty concentrating.”, “The right thoughts occurred of their own accord.”, “I felt that I had everything under control.” Response options were: Not at all (0), Somewhat (1), Moderate (2), Considerable (3), Very much (4). Reliability was good across all three blocks (Cronbach’s α ’s > .89).

Story world absorption. We selected eight items from the Story World Absorption scale (Kuijpers et al., 2014) to measure the participants attention (α ’s > .601), emotional engagement (α ’s > .758), mental imagery (α ’s > .772), and feeling of transportation (α ’s > .779) of the imagined scenarios (two items per subscale; see Table SM6.2 for the full items and the selection process). Examples are: “When I was imagining the scenarios it sometimes seemed as if I were in that world too” and “When I was imagining the scenarios, I could see the situations happening in the scenarios being played out before my eyes”. Here we will report the average full scale scores only; reliability for this overall scale was good across all three blocks (Cronbach’s α ’s > .86).

Character fusion. We adapted the pictorial identity fusion task (Swann et al., 2009) to measure how much participants were able to immerse themselves into their character and become ‘one’ with them. Participants were presented with five different pictorial options of two circles (one circle denoting oneself, and another, bigger circle denoting the character) gradually merging to become one (see Figure SM6.1). Thus, the scores possible for this measurement ranged from 1 (“A”) to 5 (“E”).

Results

Survey

First we ran an exploratory correlation analysis between our variables of interest, see Table 5. As in Study 1, most variables are significantly and positively correlated with each other, with the exception of everyday intuitive decisions in this case, which in this sample is not significantly correlated with

interoceptive awareness. See Supplementary Materials SM.8 for replication of Study 1 mediation model.

Table 5

Range, means, standard deviations, and correlations with confidence intervals of intuition variables in Study 2

Variable	M	SD	1	2	3	4	5
1. Absorption (0-4)	2.02	0.76					
2. Exteroceptive awareness (-2-2)	0.62	0.81	.67** [.59, .74]				
3. Interoceptive awareness (0-4)	2.13	0.85	.43** [.31, .54]	.42** [.30, .53]			
4. Everyday intuitive personality (-2-2)	0.60	0.77	.39** [.26, .51]	.37** [.24, .49]	.21** [.07, .34]		
5. Everyday intuitive decisions (0-100)	56.97	18.51	.33** [.19, .45]	.20** [.06, .33]	.04 [-.11, .18]	.25** [.11, .38]	

Note. *M* and *SD* are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. * indicates $p < .05$. ** indicates $p < .01$.

Awareness task

On average, participants had a score of 0.24 ($SD = 0.71$) in terms of state awareness (range -2 to +2, both the possible and attained range) on the awareness task, indicating a normal distribution (see also Figure SM9.1). We conducted a correlation analysis to further investigate performance on this task, and found it was significantly and positively correlated with exteroceptive awareness ($r = .470$, $p < .001$), interoceptive awareness ($r = .23$, $p = .001$), intuitive personality ($r = .27$, $p < .001$), and intuitive decisions ($r = .16$, $p = .03$), as well as absorption ($r = .42$, $p < .001$).

Imagination task

We examined the scores on each of the three conditions through ANOVAs; as these violated Mauchly's Test of Sphericity, Huynh-Feldt corrections are reported. We found that the participants scored higher in the first person condition than the third person condition or fictional person condition

for all measures. For instance, participants scored higher on flow state (scale from 0 to 4) in the first-person condition ($M = 2.29$, $SD = 0.92$), than third-person condition, ($M = 1.92$, $SD = 0.93$), and fictional person condition ($M = 1.66$, $SD = 0.99$), $F(1.82, 346.74) = 46.92$, $p < .001$, $\eta_p^2 = .197$. Participants also scored higher on story world absorption (on a scale from -2 to +2) in the first-person condition ($M = 0.60$, $SD = 0.74$), than third-person condition, ($M = 0.24$, $SD = 0.76$), and fictional person condition ($M = -0.12$, $SD = 0.96$), $F(1.85, 353.90) = 64.86$, $p < .001$, $\eta_p^2 = .254$. Participants also scored higher on character fusion (scale from 1 to 5) in the first-person condition ($M = 3.55$, $SD = 1.24$), than third-person condition, ($M = 2.48$, $SD = 1.18$), and fictional person condition ($M = 2.04$, $SD = 1.25$), $F(1.82, 347.21) = 122.45$, $p < .001$, $\eta_p^2 = .385$.

Next, we examined correlations between the trait measures and the imagination task measures (i.e., block ratings), see Table 6. This demonstrates that absorption was strongly correlated with all block ratings of all three imagination conditions, with smaller but still significant correlation coefficients for exteroception, whereas interoception only correlated significantly with story world absorption in the first person condition.

Table 6

Correlations between baseline trait measures and scenarios and block ratings in Study 2

Block ratings	Trait measures		
	Absorption	Exteroception	Interoception
<i>First-person condition (1P)</i>			
Flow state	.35** [.22, .47]	.27** [.14, .40]	.07 [-.08, .20]
Story world absorption	.44** [.32, .55]	.40** [.27, .51]	.16* [.02, .30]
Character fusion	.39** [.26, .50]	.30** [.16, .42]	.09 [-.05, .23]
<i>Third-person condition (3P)</i>			
Flow state	.36** [.23, .48]	.22** [.08, .35]	.06 [-.08, .20]
Story world absorption	.37** [.24, .49]	.29** [.15, .41]	.10 [-.04, .24]
Character fusion	.35** [.22, .47]	.28** [.15, .41]	.11 [-.03, .24]

Fictional person condition (FP)

Flow state	.33** [.20, .45]	.16* [.02, .29]	.04 [-.10, .18]
Story world absorption	.36** [.23, .48]	.25** [.12, .38]	.10 [-.04, .24]
Character fusion	.28** [.14, .40]	.15* [.01, .29]	.05 [-.09, .19]

Note. Pearson's r correlations with 95% confidence intervals. Significant correlations are in bold. * $p < .05$, ** $p < .01$.

Discussion

In Study 2 we designed and tested our new experimental tasks, together with the same survey as in Study 1 (with the exception of acting and acting intuition measures, though there were everyday intuition measures), and ran them on a large sample of psychology students to test them and validate them. As such, we do not intend nor are not able to make claims about acting intuition on the results of this study per se.

We assessed awareness through performance on our awareness task, which was measured with a state awareness measure (Tanay & Bernstein, 2013), and found that participants scored in a normal distribution on this task. Moreover, performance on this task was correlated with measures of trait awareness – both exteroceptive and interoceptive –, demonstrating convergent validity. We also found it correlated significantly and positively with intuitive (personality and decision) measures, as hypothesised: We proposed that intuition can occur when individuals have states of focused awareness, something which is supported by traits such as greater levels of trait awareness (including exteroception and interoception) and trait immersion (absorption).

The participants also completed our imagination task, involving imagining scenarios from a first-person, third-person, and fictional person perspective. The psychology students were consistently more immersed (as demonstrated by higher scores in terms of flow state, story world absorption, and character fusion) in the first-person condition as compared to the third-person condition, immersion in which in turn was greater than for the fictional person condition. Given that imagining engaging in scenarios from a fictional person's perspective might be common for actors, but unusual for psychology students, this is unsurprising.

In terms of associations between the participants' performance on the imagination task and their traits, we found that absorption and exteroceptive awareness were consistently correlated with the imagination block ratings, whereas interoception did not. While this finding runs counter to our initial hypotheses, it is not unexpected given that the path from interoception to absorption was also considerably smaller than that from exteroception to absorption in the mediation analyses in both

Study 1 and this study. We propose there may be a couple of explanations for this: First, it is possible that the self-report scale we used to measure interoception was not sufficient to pick up differences in interoceptive ability. Second, it is possible that for psychology students, who are not custom to imagining scenarios as a third-person, but more likely not for a fictional person like Romeo or Juliet, did not imagine the scenarios intuitively. Having a predisposition for absorption assisted with imagining fiction, as previously demonstrated (Kuijpers et al., 2014), but that is not the same as engaging with one's intuition while acting or imagining, which involves not just immersion, but also an attunement to one's environment and oneself (de Wet, 2023).

Study 3

Introduction

Having validated our survey measures (Study 1) and task measures (Study 2) pertaining to our conception of intuition, we next set out to test the acting training method in a feasibility study. The training was borne out of a perceived gap between the recognition of intuition's role in acting performance and an absence of a practical, implementable training programme to directly develop an actor's intuition. The new training method consisted of exercises focused on mental and motor imagery techniques, biofeedback, guided meditation, and psychosomatic aspects of play. By using a longitudinal design, we would have some control over factors that we have hypothesised influence intuition in acting, and would be able to assess if the training would indeed be able to increase or develop an actor's intuition.

In this study, 20 acting students in four groups participated in an 18-hour acting training, spread out over 4-6 sessions (one group received a 15.5 hour training spread out over 3 sessions). We ran a pre-training and post-training session with a short survey (see Study 1 & 2) and the awareness and imagination tasks (see Study 2), so that we could compare results from before to after the training. We also investigated how the acting students of Study 3 (as measured before the training) compared to the Study 2 psychology students on the survey and experimental measures, to further examine characteristics specific to actors.

We hypothesised that the acting training would increase the participants' acting intuition through increases in their abilities for awareness and immersion. Moreover, we hypothesised that the Study 3 participants (acting students) would score higher than the Study 2 participants (psychology students) on exteroceptive and interoceptive awareness and absorption, as well as on the awareness and imagination tasks, especially for the fictional person condition.

Methods and Materials

Participants

Participants were recruited from performance schools, talent agencies, universities and colleges in the United Kingdom, South Africa and Australia. These countries were selected given previous connections between the authors and the acting institutes there. Some participants were also recruited via the survey of Study 1, where they were given the option to express interest in the longitudinal study at the end of the survey. Those who expressed interest were then interviewed prior to being placed in the training programme, to check that real people signed up and to get a sense of the participants for the training facilitator's safety (given that this was a virtual workshop, and these people were unknown to the researchers prior to the project), and to assess their commitment and intentions for engaging with the practice. No financial remuneration was offered. The training was given to them for free.

Twenty participants (9 female, 11 male; age range 19-57 years, $M = 26.6$, $SD = 9.6$ years) took part in the acting intuition training, which took place in four groups ($n=6$, $n=4$, $n=4$, and $n=6$ respectively). Eight participants were resident in South Africa ($n=6$ in group 1, $n=2$ in group 4), six participants in Australia ($n=6$ in group 4), five participants in the United States ($n=3$ in group 2, $n=2$ in group 3), and one participant was resident in the United Kingdom ($n=1$ in group 2). The participants had or have been studying for 0-28 years ($M = 4.5$, $SD = 6.2$), and the majority of participants had previously engaged in Stanislavskian-based trainings ($n=18$, 90.0%). In terms of mindfulness engagement, four participants did not engage in mindfulness (20.0%), eight were occasionally engaged (40.0%), three were engaged (15.0%) and five were very engaged in mindfulness (25.0%).

Procedure

The training programme took place in three to six online sessions for a total of 15.5 or 18 contact hours (see for the exact schedule, Table SM10.1), with a further 2-4 hours for additional tasks such as the surveys, journaling, and script reading. All participants took part individually, except for Group 4, who were all in the same room at the Western Australian Academy of Performing Arts (WAAPA), Perth. All participants who underwent the training programme (see Table SM11.1 for an overview) were guided through the exercises by one of the authors, who acted as the facilitator of this training. The exercises were designed as individual explorations (with the exception of script and scene work, where the exercises were put to practice). Before an exercise, participants were instructed on what to do. They were allowed to ask questions in order to clarify any concerns or queries, but a favourable outcome was never communicated to them, so as not to bias their experience. The participants were encouraged to give feedback regarding their experiences in focused group discussions. They also kept a journal to reflect on the experience in process. The participants were given feedback if it related to concerns and direct queries regarding an application of an exercise. An opportunity to act as a witness to others' experiences was then offered to the participants, which is typical in acting training techniques that work on similar principles (i.e., somatic practices). As a witness, a participant does not

do the exercise themselves, but participates and learns through observing the process of a fellow participant. Before and after the training, participants completed the survey and task measures. Participants read an information sheet and completed a consent form prior to taking part in the first session. Ethics approval for this study was obtained from the University's Ethics Committee prior to data collection and the training (P109895).

Measures

We used the acting-specific questions from Study 1 and all survey and task measures from Study 2. See Table SM1.1 and Table SM7.1 for reliability scores.

Survey

The survey in pre-training session was identical to that of Study 2, with the addition of acting-specific questions from Study 1. For the post-training session, we measured exteroceptive awareness, interoceptive awareness, everyday intuitive decisions, and acting intuitive decisions only, as we took the other measures such as the personality measures (e.g., absorption, intuitive personality) to be constant.

Ambiguous Decisions task. We added four acting scenarios for the Ambiguous Decisions task, as we only had four from Study 1, and we needed eight in total (four for the pre-training and four for the post-training session), see Table SM12.1. As in the first set of these scenarios, we created one scenario pertaining to interpreting bodily sensations, one to not emotionally connecting, one in the middle of an action, and one where something unusual happens. We created a new set of scenarios to not let the participants' previous answers (which they may have remembered) influence them. Unexpectedly however, the reliability for the four new *everyday* intuitive decisions on the Ambiguous Decisions task was extremely low in the post-training session ($\alpha = .10$, $\omega = .31$). As such, we ran a factor analysis on the four scenarios, and picked the two scenarios that together loaded on the largest factor, which lead to still relatively poor but improved reliability ($\alpha = .42$). We kept this measurement despite the lower reliability given that the reliability for these items was not as low in Study 2; it is possible that the reliability is lower than expected due to the smaller sample size of Study 3. Moreover, we wanted to match the measurements before the training as closely as possible; therefore, it would not work to change to a different intuition measure. All in all, we will assess the scores on this measure in light of the nature of this study: as a feasibility study. We have listed all scenarios and intuitive decisions with means and standard deviations in the Supplementary Materials for transparency, see Table SM12.2.

Expectations & appraisal of training. In addition to measures of Study 1 and 2, questions were asked to investigate the participants' expectations of the training, and their appraisal afterwards, focused on whether the training will have an effect on their intuitive capacity, whether the training

will contain new knowledge or skills, and have an influence on their performance and whether they will enjoy the training, see SM.13 for more details.

Tasks

We used the same tasks as in Study 2, the attention task and the imagination task, and their measures (State Mindfulness Scale, block ratings of flow state, story world absorption, and character fusion). See Table SM7.1 for the full reliability scores.

Results

Survey and task results and comparisons to Study 2

First, we examined the Study 3 participants' scores on the baseline survey to the results of Study 2 (see also Table SM14.1). Absorption was significantly higher for acting students ($M = 2.51$, $SD = 0.62$) than for the psychology students ($M = 2.02$, $SD = 0.76$; $t(210)=2.79$, $p = .006$). Exteroceptive awareness was also significantly higher for acting students ($M = 1.17$, $SD = 0.64$) than for the psychology students ($M = 0.62$, $SD = 0.81$; $t(211)=2.94$, $p = .004$). Finally, interoceptive awareness was also significantly higher for acting students ($M = 2.55$, $SD = 0.69$) than for the psychology students ($M = 2.13$, $SD = 0.85$, $t(212)=2.17$, $p = .004$). There were no significant differences in intuitive everyday personality ($t(211)=0.56$, $p = .57$) or intuitive everyday decisions ($t(212)=-0.07$, $p = .94$). For Study 3 participants, absorption correlated with exteroception ($r = .64$ [.27, .84], $p = .003$) but not interoception ($r = .37$ [-.09, .70], $p = .11$), which did correlate with each other ($r = .46$ [.01, .75], $p = .04$).

As for the awareness task, Study 3 participants ($M = 0.56$, $SD = 0.60$) scored just higher than the Study 2 participants ($M = 0.24$, $SD = 0.71$), $t(216) = 1.95$, $p = .05$. In the pre-training session, the Study 3 participants' score on the awareness task ($M = 0.56$, $SD = .60$) did not correlate with exteroceptive awareness (though there was a trend, $r = .43$, $p = .06$) or interoceptive awareness ($r = .20$, $p = .41$), in contrast to the findings of Study 2. It did correlate with intuitive everyday personality ($r = .68$, $p = .001$), but not everyday intuitive decisions ($r = .22$, $p = .35$). It also correlated with intuitive acting personality ($r = .60$, $p = .005$) and intuitive acting decisions ($r = .56$, $p = .01$), as well as absorption ($r = .55$, $p = .01$).

In the pre-training session, the Study 3 participants' scores on the imagination task were higher than the Study 2 participants' scores in for all block ratings in the fictional person condition, and for story world absorption in the third person condition, see Table 7.

Table 7

Independent samples t-tests comparing block ratings of the imagination task between the participants of Study 2 ($n=198$; psychology students) and the participants of Study 3 ($n=20$, acting students)

Ratings	First-person (1P)	Third-person (3P)	Fictional person (FP)
Flow state	$t(215)=-0.29, p=.78$	$t(216)=0.64, p=.52$	$t(212)=2.28, p=.02$
Story world absorption	$t(215)=1.08, p=.28$	$t(215)=2.13, p=.03$	$t(214)=3.45, p=.001$
Character fusion	$t(216)=0.35, p=.73$	$t(216)=1.85, p=.07$	$t(215)=3.46, p=.001$

Note. Significant and positive t -values indicate that Study 3 participants scored higher than Study 2 participants on those ratings. For Study 3, pre-training scores are used. t -tests with p -values $< .05$ in bold.

We briefly examined correlations of the Study 3 participants' imagination scores with the traits (see Table SM15.1), though note that due to the small sample size, these findings should be approached with caution. Though many of the r -values were higher than those in Study 2, most did not reach significance due to significantly smaller power. Interestingly, a difference between the two groups was a strong, significant correlation between interoception and flow scores in the first-person condition ($r = .44$ [.00, .74], $p = .05$) for the Study 3 but not Study 2 participants.

Training results

We examined differences on our survey and task measures before and after the training through repeated measures ANOVAs, see Table 8. We found that the participants made significantly more intuitive decisions in hypothetical everyday and acting situations after the training as compared to before the training, though scores on interoceptive and exteroceptive measures did not differ significantly from after to before. In terms of the awareness task, participants were significantly more mindful during the task after the training as compared to before.

We investigated whether these changes were influenced by the expectations and appraisals of the training (for full descriptions, see Supplementary Materials SM.13) through correlational analyses. The significant differences were not correlated to expectations before the training, with the exception of the increase in state awareness, which was correlated with whether participants expected to learn new things (knowledge or skills) in the training ($r = .45, p = .05$). There was also a trend for a negative correlation between whether people expected they would enjoy the training and the increase in intuitive everyday decisions ($r = -.43, p = .06$); all other r -values $< .12$, p -values $> .61$. There were no significant correlations of the significant differences with the participants' appraisal of the training (r -values $< .29$, p -values $> .22$).

Table 8

Comparison of means (standard deviations) on measures of interest from before to after the training in Study 3 through repeated measures ANOVAs

<i>Variable</i>	Range	Pre-training	Post-training	Comparison statistics
Interoception	0-4	2.55 (0.69)	2.66 (0.77)	$F(1,19) = .54, p = .46, \eta_p^2 = .03$
Exteroception	-2-2	1.17 (0.64)	1.24 (0.51)	$F(1,19) = .21, p = .65, \eta_p^2 = .01$
Intuitive everyday decisions	0-100	56.65 (14.55)	75.12 (14.34)	$F(1,19) = 18.47, p < .001, \eta_p^2 = .49$
Intuitive acting decisions	0-100	66.07 (18.73)	73.79 (16.44)	$F(1,19) = 5.34, p = .03, \eta_p^2 = .22$
State awareness	-2-2	0.56 (0.60)	0.79 (0.56)	$F(1,19) = 5.42, p = .03, \eta_p^2 = .22$

Imagination task

Next, we compared performance on the imagination task – which were our task measures of immersion – from before the training to after the training through repeated measures ANOVAs, see Table 9 (and Figures SM16.1-SM16.3). All significant differences reflect *increases* in ratings from before the training to after the training. We furthermore examined whether the difference scores differed between the three conditions – in other words, whether participants improved more on the 1P, 3P, or FP condition compared to each other. None of the repeated measures ANOVAs for the comparison of differences in block ratings was significant (F -values (2,38) = .44-1.21, p -values .31-.65), indicating that participants did not improve more on a single condition. We followed these analyses up with examination of whether these changes in imagination measures were driven by the training-induced changes in state awareness by running repeated measures ANOVAs where the change in state awareness from before to after the training was entered as a covariate (see Table SM16.1). We found that, when we account for the training-induced difference in state awareness (reflecting increases in *state* exteroceptive and interoceptive awareness as a result of the training), the pre-to-post training differences in imagination ratings disappear (with just a trend for character fusion in the first person condition remaining, $p = .06$).

Finally, we explored whether gender played a role in the changes resulting from the training (Goldstein & Winner, 2012) by running ANOVAs comparing the difference scores between the two genders (male, female) of the participants, but found no significant differences between the genders (F -values = 2.54 to <0.01, p -values = .13 to .97, η_p^2 -values = .124 to <.001).

Table 9

Means (standard deviations) and repeated measures ANOVAs comparing after versus before the acting training for imagination task ratings in the three conditions in Study 3

	Scores		
Ratings	Pre	Post	Comparison statistics
<i>Condition: First person (1P)</i>			
Flow state	2.23 (1.07)	2.68 (0.68)	$F(1,19) = 4.52, p = .05, \eta_p^2 = .19$
Story world absorption	0.79 (0.68)	1.08 (0.43)	$F(1,19) = 4.21, p = .05, \eta_p^2 = .18$
Character fusion	3.65 (1.14)	4.45 (0.89)	$F(1,19) = 10.48, p = .004, \eta_p^2 = .36$
<i>Condition: Third person (3P)</i>			
Flow state	2.06 (1.03)	2.35 (0.83)	$F(1,19) = 4.55, p = .05, \eta_p^2 = .19$
Story world absorption	0.62 (0.72)	0.69 (0.64)	$F(1,19) = 0.28, p = .61, \eta_p^2 = .01$
Character fusion	3.00 (1.38)	3.30 (0.87)	$F(1,19) = 1.21, p = .29, \eta_p^2 = .06$
<i>Condition: Fictional person (FP)</i>			
Flow state	2.19 (0.94)	2.53 (0.76)	$F(1,19) = 2.81, p = .11, \eta_p^2 = .13$
Story world absorption	0.64 (0.77)	0.81 (0.63)	$F(1,19) = 1.28, p = .27, \eta_p^2 = .06$
Character fusion	3.05 (1.23)	3.40 (1.23)	$F(1,19) = 1.15, p = .30, \eta_p^2 = .06$

Note. Scenario ratings are on a scale from 0-4, for block ratings, flow state on a scale from 0-4, story world absorption (and subscales) on a scale from -2 to 2, pictorial fusion on a scale from 1-5. Bold means (and SDs) significantly differed from before to after the training, though this effect disappeared when accounting for differences in state awareness.

Discussion

The main aim of Study 3 was to longitudinally test the effects of an especially developed training on intuition for actors. To this end, we recruited 20 acting students who participated in the training over the course of three to six sessions, and who completed a set of survey measures (see Study 1 and 2) and experimental task measures (see Study 2) before and after the training. In addition, we compared results on the awareness and imagination tasks of these acting students with those of the psychology students (Study 2).

The training programme was designed to develop the participants' intuition by engaging and developing their interoceptive and exteroceptive awareness through a re-direction and application of their attention. This training facilitated a process whereby an actor's sensitivities to their sensing states are increased, while the effort and force they use to foster and engage with these sensitivities is

decreased. The training was based on the success of previous somatic (i.e., psychophysical) practices which were able to achieve similar outcomes with a focus on proprioceptive awareness (see for examples, Alexander, 1990; Beringer, 2010; Eddy, 2016).

Interestingly, the participants' scores on the survey measures of *trait* interoception and exteroception did not change from before to after the training, but their performance on the *state* awareness task did, as did the measure of intuitive decisions – in both everyday and acting scenarios. One possibility for the lack of change in trait interoception and exteroception is that there was floor effect - a high baseline to begin with. And indeed, if we compare the interoception and exteroception scores of the Study 3 participants across the board (see Table SM14.1), then it appears that they score the highest on both traits - higher even than the highest averages in Study 1; that of recognised actors. While we must not take interpretation of these values too far – as this is a feasibility study with a smaller sample -, this may be evidence for a selection bias. After all, the acting training was an intensive programme that spread across several days. Therefore, it is possible that those who volunteered to participate were the type of individuals who have high levels of interoception and exteroception.

With regards to the imagination task, we found that the block ratings pertaining immersion – whether the participants experienced overall flow while imagining, overall story world absorption, or overall character fusion during the imagining of the six scenarios for each condition – increased from before to after the training for the first-person condition (and flow state in the third person condition). One explanation for this happening only in the first person condition might be that familiarity with the task improved the first-person condition given that it is a common form of event imagination (van Mulukom, 2013), not strictly tied to fiction or more unusual imagination processes, like the fictional and third person conditions. Previous research has demonstrated that ratings of imagined personal events increase with repetition (van Mulukom et al., 2013).

However, scores on all three conditions increased in size, and while not significantly so, there were no significant differences between the (before-to-after) differences of each of the variables, meaning that statistically the participants did not improve more on one type of imagining variable than another. The relatively lower number of participants, which was a consequence of the time-intensive training programme, should be taken into account here, as it decreased our statistical power. Nonetheless, when training-induced changes in state exteroceptive and interoceptive awareness (but not trait exteroceptive and interoceptive awareness, which were unchanged) were taken into account in these analyses, many of the previously significant changes in imagination ratings from before to after the training were no longer significant. This suggests, in line with our hypotheses, that the training-induced changes in state awareness were driving the training-induced changes in immersion.

When comparing the pre-training results of the acting students with the psychology students of Study 2, we found that the acting students scored higher on absorption than the psychology students in line with previous findings (Panero et al., 2016), as well as exteroceptive awareness,

interoceptive awareness, and state awareness (i.e., performance on the awareness task), with no significant difference in everyday intuitive personality and everyday intuitive decisions. We suggest this may point at the effects of the actors' previous practices. Acting training generally often involves exercises aimed directly at improving sensory awareness (McCaw, 2020; Reese, 2015). Therefore, even though most of these exercises may have had a proprioceptive focus as we highlighted earlier on, they likely nonetheless increased the actor's potential for absorption as a form of hyper-focused attention and immersion. Interestingly, while it has been demonstrated that experienced meditators score higher on absorption than non-meditators or beginners (e.g., Berkovich-Ohana & Glicksohn, 2017; Davidson et al., 1976), the effects of training on absorption remain to be systematically investigated (Lifshitz et al., 2019).

Moreover, when comparing the conditions of the imagination task, we found that only in the fictional person condition acting students scored consistently higher on our immersion measures (i.e., flow state, story world absorption, and character fusion) than the psychology students. This is in line with what we predicted, as imagining scenarios for oneself or even through the eyes of someone else are tasks we all regularly engage in (i.e., event simulation and theory of mind, respectively), whereas imagining a fictional character which could not occur in the here and now such as Romeo or Juliet is something that is firmly in the realm of acting.

General discussion

In the present research, we have investigated an aspect of acting capability that is not typically empirically examined, despite its importance to Western mainstream acting training: intuition. We conceptualised intuition as a state which occurs when someone has sufficient interoceptive and exteroceptive awareness and is in a state of immersion. Conceptualising intuition as a cognitive state reliant on a set of cognitive-affective processes implies that there are individual differences in these abilities, and it entails that we may be able to train these capabilities. In line with these suggestions, we put forward three hypotheses: (1) the capacity for immersion and (exteroceptive and interoceptive) awareness together underlie the actor's intuition; (2) there are individual differences in these psychological capacities, and (3) these capacities can be practiced, developed, and trained. We tested these hypotheses through three studies, through which we also tested and validated our new survey items and behavioural measures.

In line with our first hypothesis, Study 1 confirmed that higher levels of trait interoceptive and exteroceptive awareness and absorption are associated with greater intuitive acting personality and decisions. Study 2 demonstrated that trait absorption and exteroception were moreover associated with immersion in imaginative tasks (i.e., the experience of flow states, story world absorption, and fusion with the imagined character), with a more minor role for trait interoception. Study 3 showed that improvements in immersion can be established through training interoceptive and exteroceptive

awareness. Thus, we suggest that absorption, exteroceptive and interoceptive awareness are crucial in supporting intuition in the context of acting.

In line with our second hypothesis, we found individual variation in the participants' abilities for intuition. When comparing psychology students with acting students, we found that acting students scored higher on absorption, exteroceptive awareness, and interoceptive awareness than the psychology students, in line with similar previous research on absorption (Panero et al., 2016). Acting students also performed better when imagining scenarios from the perspective of a fictional person (Romeo or Juliet), even when accounting for knowledge of the play *Romeo and Juliet*. While it may be the case that people who score more highly on absorption, exteroception, and interoception may be more attracted to acting than those who score lower (signifying a natural variation in these traits), we also have some preliminary evidence that these capacities can be practiced – which we also examined.

In line with our third hypothesis, we found in Study 3, the feasibility study, that our training method, focused on developing and encouraging attention and exteroceptive and interoceptive awareness, was able to increase state awareness in the participants, which in turn supported immersion and imaginative processes. This longitudinal finding corroborates cross-sectional results from Study 1, which showed that relevant practices, such as engagement with mindfulness meditation, previous engagement in Stanislavskian-based practices, and experience in acting, all contributed to acting intuition.

Absorption together with awareness led to the greatest scores of immersion into the imagining, feeling one with the character, and being in the flow. In this way, it also builds on previous work on flow in acting (Robb & Davies, 2015), while adding new psychological measures. It has combined these insights with imagination tasks for actors from a neuroscience approach (Brown et al., 2019) and imagination scores from narrative fiction research (Kuijpers et al., 2014), so as to provide appropriate context for the processes we examine, in lieu of testing actors before and after performances in established theatres – something which may be an avenue for future research. This research extends previous research examining absorption in (adult) actors (Panero, 2019; Panero et al., 2016; Panero & Winner, 2021) by using a framework of embodied cognition to create a holistic overview of different processes at work when an actor is 'in the zone'; what we call 'acting intuitively'. Something that asks for further is how exteroceptive and interoceptive awareness together to support immersion: In Study 1 we found that these types of sensory awareness lead to acting intuition *via* absorption, and in Study 3 we found that the effect of the acting intuition training on measures of immersion was reduced or made insignificant when accounting for increases in state awareness. Thus, our studies suggest that immersion is crucially supported by awareness, which is in line with flow research and absorption research, both of which put a focus on the requirement for hyperawareness, but which remains to be fully worked out as a directional process on a conceptual level.

This research moreover contributes to insights on the role absorption plays in acting (Panero, 2019; Panero et al., 2016). Being absorbed is suggested to involve imperviousness to distracting events, an enhanced sense of the realism of the attentional object, and an altered sense of reality in general, including an empathically altered sense of self (Tellegen & Atkinson, 1974). In other words, people with high levels of absorption are more likely to blur the boundaries between mind and world and between imagination and perception, and to experience the object of their attention as real in a sensory way (Lifshitz et al., 2019), allowing them to become immersed in fictional worlds. However, absorption and the associated boundary blurring, especially in full immersion in method acting, has also been associated with harmful psychological effects, such as dissociation and trauma (Panero, 2019; Thomson et al., 2009). Dissociation may be a case of absorption going ‘too far’, beyond what works for the performance (Thomson & Jaque, 2012a), also affecting wellbeing negatively. It is possible, however, that some of the negative effects can be traced back to Lee Strasberg’s American adaptation of Stanislavski’s techniques in method acting (Gordon, 2010), which requires actors to use their own memories and emotional upheavals in order to connect with a character (Strasberg, 1987). Instead, it may be safer to use meta-awareness and sensory awareness of the current circumstances (as they are unfolding in the story world) to respond and act intuitively, rather than inserting one’s own emotional memories into the character and world. In this way, actors can ‘become’ the character but remain immersed in *narrative* reality.

One way in which this may be done, may be through a ‘distinct cognitive attitude’ (Schroeder & Matheson, 2006). According to Schroeder & Matheson’s theory, when one uses imagination as a distinct cognitive attitude, then one perceives and treats self-generated representations or representations of fictions as different from external representations created by real events and objects (see also the distinction between alief and belief, Gendler, 2008). A distinct cognitive attitude within the immersive process provides actors with an opportunity for their imagination to adapt to exploring the narrative fiction as its own reality in performance, without blurring or distorting parameters of ‘real’ and ‘imagined’ in their daily lives off-stage or screen (Schroeder & Matheson, 2006). Imagination is an integral cognitive tool in and for performance (Chekhov, 1985), and the perception of and agency given to imagination has the power to both shape it and its capacity (Schroeder & Matheson, 2006); which in turn affects interoceptions and exteroceptions as sensory products of cognition in the enactive cognition framework (see below). In line with this idea, one study suggests that actors may have better ways to cope with psychological issues (such as unresolved mourning, which they were found to have more of), due to enhanced self-regulation skills in face of the psychological demands of acting (Thomson & Jaque, 2012b).

Our findings, including that training-induced changes in state awareness were driving the training-induced changes in imagining, provide evidence for the idea that awareness crucially supports imagination, which can be interpreted within the *enactive* sense of cognition within an embodied framework of cognition. Enactivism proposes that cognition is a process of sense-making

that is bound to action (Colombetti, 2014; Gallagher, 2017) and suggests that cognition is a process that is made *between* the body and the environment. Where classic or computational frameworks proposes that cognition entails mental representations of the outside world (Clark, 2013; Hohwy, 2018), enactivism suggests that cognition is a process that transpires between the individual and environment, making it dependent on the *interaction* an agent experiences and co-creates in order to make sense of themselves and their environments. Thus, our findings support the notion that awareness plays a crucial role in supporting imagination, aligning with the enactive sense of cognition that highlights the interplay between the body, the environment, and the process of sense-making.

There were some limitations to the studies in this research, mostly centred on the measurement tools employed. By running a psychological and cognitive exploration of a humanities context – drama, theatre studies – cross-disciplinary translations were necessary, and we aimed to find the most suitable tools to run our investigation. This meant having to make some concessions to the richness of theatre studies theories, adapting existing psychological tools for our use, or developing them when they presented as inadequate for our needs. This meant occasional lower reliabilities (though see our solutions to these occurrences in the methods and discussed below), and less good fits than we would have liked.

For example, we used the Body Perception Questionnaire-Short Form (BPQ-SF; Cabrera et al., 2018) to measure interoceptive awareness, but this is a temporary snapshot focused on body perception and autonomic reactivity; given that we were also interested in how much the participants notice and trust these sensations, we may also have used the trust subscale of Multidimensional Assessment of Interoceptive Awareness scale (MAIA; Mehling et al., 2012). Moreover, we did not adapt the interoception and exteroception scales to an acting context specifically, though intuition may be context-specific (Gigerenzer, 2007; Myers, 2008). Nonetheless, we found that everyday intuition and acting intuition were highly correlated, alleviating some of these concerns. Moreover, when predicting everyday intuitive personality and decisions in a mediation analysis in Study 2, it was found that these were predicted by exteroceptive and interoceptive awareness via absorption, as in Study 1 for acting intuitive personality and decisions. However, intuition may be more than the sums of its parts. To overcome this issue, future research may involve creating an intuition questionnaire encompassing each of our hypothesised aspects to create a comprehensive measure.

We had a similar assessment issue with the measurement of flow. We selected the flow state scale (Jackson & Marsh, 1996) because there are many similarities between absorption and flow (Pianzola, 2021) and because flow has been frequently associated with acting (Alfreds, 2007; Robb & Davies, 2015; Silberschatz, 2013), rendering it an important aspect to examine. However, we suggest that a less orthodox interpretation of flow than that of the flow state scale may be more appropriate. We have suggested that as a sustained state, intuition may involve an immersive, flow-like experience that works when an agent becomes focused on experiencing the task and releasing a sense of control. This is however in contrast to the scale conceptualisation of flow, which crucially involves working

towards a goal (Jackson & Marsh, 1996). When one is working towards a specific objective, it is likely that the individual pays attention only to the cues that are relevant to that objective. In the intuitive state, in contrast, the idea is that the actor attends to novel sensory cues in the environment as they unfold, rather than a specific subset tied to some goal. . This entails that immersion required for intuitive action may rely on absorption into the imagining and becoming one with the character, rather than an orthodox interpretation of flow. However, we hope that we have reduced these issues by selecting specific items from the Flow State scale (Jackson & Marsh, 1996), specifically from the Action-Awareness Merging, Concentration on Task at Hand, Paradox of Control, Challenge-Skill Balance subscales and not the other subscales.

Another limitation is that we did not measure trait absorption before and after the training. While we theoretically assumed that it is possible to train absorption (in line with recent suggestions; e.g., Lifshitz et al., 2019), we felt that the most common measure of trait absorption currently – the Tellegen Absorption Scale (Tellegen & Atkinson, 1974) – does not lend itself well to retesting in a short timeframe when subtle changes are expected, and moreover tests what people do in general rather than specialised contexts. While we cannot provide a solution here, some suggestions have been made for literary contexts (Kuiken & Douglas, 2017), and we did find a small increase on the story world absorption scale (Kuijpers et al., 2014) for the first-person condition in Study 3, suggesting that feelings of absorption can change. How this relates to potential changes in trait absorption remains to be investigated.

Overall, methodological issues with measuring embodied cognitive states, like intuition, but also like flow, are not new. It is suggested that combining a variety of measures may be a better approach to measuring such potentially elusive states (Swann, 2016). Indeed, the research presented here is also based on interviews with actors, where they discussed how they perceive and experience acting intuition (de Wet, 2023): We used insights from these interviews in deciding how to measure acting intuition, and moreover which psychological task and survey measures to employ to best assess awareness and immersion as a part of acting intuition. The participants in Study 3 furthermore provided qualitative feedback throughout their training in a journal-style fashion. Those data were not included here but can be read in de Wet (2023). Study 3 contained 20 participants, which is typically considered a small sample for psychology studies, due to the time and resource intensive nature of the acting intuition programme, which cannot be given to large groups of individuals simultaneously. However, this study employed a longitudinal design, reducing some of the concerns that come with smaller samples, and we have proceeded our interpretations with caution, commensurate with this sample size of this feasibility study, and focused primarily on the longitudinal results. In addition, similar studies examining interventions have similar or smaller sample sizes, such as a somatic training programme for dancers aimed at increasing interoceptive ability, which had 12 participants (Wallman-Jones et al., 2022), and longitudinal flow interventions in athletes, which had 11, 16, and 21 participants (Chen et al., 2018; Hill et al., 2021; Kaufman et al., 2009). An avenue for future

research in inter- and trans-disciplinary studies could thus explore ways and measures of integrating qualitative and quantitative data in a way that does not require one or more of the disciplines to compromise their standards.

Another limitation of this study was that the workshops had to be virtual due to the COVID-19 pandemic. This meant that when participants decided to act as a witness to another participant's process, this involved joining a Zoom 'break-out room' to virtually observe others' exercises or to observe the conversations taking place. One effect of this was that a live dynamic could not unfold. However, participants did comment that the virtual environment facilitated a less self-conscious space for them to explore (de Wet, 2023). Moreover, the fact that effects were detected despite this limitation is to us an encouraging sign for potential future implementations of the training programme in face-to-face settings.

In the present study, we have not addressed improvisation, which is a style of performance with a unique history that would require its own dedicated study. Improvisation, like intuition, appears to require high levels of attunement to the present moment, but, we argue, is much more closely linked to habitual action-response where tacit knowledge guides the actors, rather than allowing intuitive behaviour to lead the actor with a sense of openness and curiosity – though we concur there may be overlap in these processes, depending on the context and actors involved. Moreover, we have not assessed other personality traits and correlates of creativity besides absorption and intuitive personality. Previous research has demonstrated higher levels of openness (Dumas et al., 2020), extraversion, and agreeableness for actors as compared to the general public, with a strongly empathizing cognitive style (Nettle, 2006). A complete psychological profile of actors may shed further light on predispositions to, and individual differences in, acting intuition beyond those following acting training and education.

Another recommendation for future research is to investigate the physiological processes underlying intuition in acting and outside this context. Given that intuition as defined here is an embodied cognitive state, we would expect that there are ways in which these processes are expressed, or have an effect, physiologically, such as through neuronal activity, heart rate variability, muscle activity, or metabolic rate (Swann et al., 2012). When measured psychophysically, we may expect an increased interoceptive accuracy in actors, as previously found in dancers (Christensen et al., 2018) after a somatic training programme (Wallman-Jones et al., 2022). Similarly, we suggest that the role the gastrointestinal system (i.e., the gut) may be investigated in future research, considering the affective role we propose intuition plays and is bound to. On-going neurobiological research regarding the production of affect and the gut-brain axis has demonstrated the potential importance this system may play in generating and regulating affect. Crucially, this research is subject to the technology we currently have on hand to be able to study the gut (Allen et al., 2017; Miller, 2018).

Through the present research project, we have attempted to challenge the belief that intuition is an inaccessible and undevelopable phenomenon. By being able to develop and then utilise intuition

in rehearsal and performance settings, we propose actors may find themselves equipped with an inherent process that could assist them in being present, attentive, and responsive to the dynamics of live performance. The utilisation of intuition in acting may be an attractive alternative for actors who do not wish to use existing techniques to illicit their emotions in performance but still wish to act in the Stanislavskian style, honouring performances that feel and look authentic (i.e., life-like). Moreover, the techniques proposed here may be particularly useful for rehearsals in today's mainstream industry, which do not always provide the explorative space to revisit and reshape techniques and moments, due to a significant lack of time (Evans, 2019), as opposed to other training systems which may still use techniques that pre-date, and do not adequately address, today's challenges (de Wet, 2023; Spatz, 2015).

In conclusion, in this research, a series of studies lend support to the idea that intuition, as an embodied cognitive state, is centrally supported by exteroceptive and interoceptive awareness; mechanisms which, when fine-tuned, allow individuals to process sensory inputs intuitively while staying immersed in a task. Next steps could be to further examine intuition this way in contexts beyond acting, to investigate whether everyday intuition is similarly supported by awareness and immersion. Finally, this research suggests that the actor's intuition may be developed, in particular by focusing on training interoceptive and exteroceptive awareness. Thus intuition may be utilised by actors as an embodied tool that could potentially cultivate performances and character portrayals that are in tune with an environment and deals sensitively with the dynamics of live performance; heightening the experience and perception of the performance alike. Overall, the project contributes to the cognitive science of acting at large, an underrepresented area of research (Goldstein & Bloom, 2011).

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