

## Reflecting on the art making process

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This article reports on a mixed method study of painting and drawing activities of professional artists utilizing semi-structured interviews documenting affective states. The experiential data was supplemented with empirical data utilizing experiments. In experiential data gathering, due to many complex layers of processing, people often intellectualise or censor their responses between an emotional reaction and a verbal report. In this study the empirical assessment options of skin conductance, peripheral skin temperature, respiration and heart rate (blood-volume-pulse) measured physiological reactions whilst making art. The rationale for conducting such empirical assessments is to establish whether a correlation can be found between artists' affective descriptions of the art making experience and physiological responses of participating artists.

**Key words:** Affective descriptions, physiological responses

#### Nabetragting oor die verloop van kunskep

Hierdie artikel gee verslag oor 'n gemengdemetode studie van die emosionele stemming van professionele kunstenaars tydens teken- en skilderaktiwiteit deur gebruik te maak van semi-gestruktureerde onderhoude. Die ervaringsdata is aangevul deur empiriese eksperimente. Tydens ervaringsdata-insameling, as gevolg van etlike lae komplekse verwerking, is mense soms geneig om hulle antwoorde in die tydsverloop tussen 'n emosionele reaksie en 'n verbale verslag te intellektualiseer of sensor. Hierdie studie gebruik empiriese bepalinge om velkonduktiwiteit, omtreksveltemperatuur, asemhaling en hartklop te bepaal. Die grondrede vir hierdie empiriese bepalinge is om vas te stel of daar 'n korrelaat bestaan tussen kunstenaars se emosionele beskrywings en hul fisiologiese respons tydens die verloop van kunskep.

**Sleutelwoorde:** Emosionele beskrywings, fisiologiese reaksie

The debate that C.P. Snow (1965) initiated when he referred to a comparison of “the two cultures”, best understood as art (in particular the literary) versus science (the physical sciences), and literacy versus numeracy, was not new at the time, and continues to this day. As recently as 2000 the art historian Gombrich (2000) challenged the neuroscientists Ramachandran and Hirstein's theory of human artistic experience and the neural mechanisms that mediate it (1999). The authors of this article do not set out to explain art per se, but rather investigate aspects of the art making experience. We argue that neither qualitative nor quantitative research paradigms need to be mutually exclusive, and that a multimethod approach is needed to make the art making experience more understandable. This article reports on a mixed methods study, utilising experiential research methods and enhancing the study with supplemental empirical data, utilising experiments, in which we investigate possible correlates between artists' affective descriptions of the art making experience and experimental data of physiological responses.

Van Manen (2007: 11) describes phenomenology of practice as being formative of sensitive practice, issuing from the pathic power of phenomenological reflections. “Pathic knowing inheres in the sense and sensuality of our practical actions, in encounters with others and in the ways that our bodies are responsive to the things of our world and to the situations and relations in which we find ourselves”. He suggests that the phenomenologist directs the

gaze towards the regions where meaning originates, in order to reflect on the lived experience of human existence, "...free from theoretical, prejudicial and suppositional intoxications. But, phenomenology is also a project that is driven by fascination: being swept up in the spell of wonder, a fascination with meaning" (van Manen 2007: 11). It is from such a position that semi-structured interviews were conducted and recorded – not intended to record technical understandings or cognitive perceptions, but rather to explore the deeply intimate relational, corporeal and temporal 'lived' experiences of the artist. Van Manen suggests (2006: 713) that when writing on others' experiences, "[I]t requires that we be attentive to... subtle significations in the way that things and others speak to us... These words need to touch us, guide us, stir us".

It is reasonable to suggest that people often intellectualise or censor their responses between an emotional reaction and a verbal report - Ramachandran (2011: 70) explains that this is due to many complex layers of processing. This is where empirical methods may complement experiential data gathering. Equally, over-reliance on direct quantitative methods to measure emotional reactions of experiences could skew research findings. In principle the authors concur with Farah's caution (2004) (when she refers to brain imaging techniques), that methods that can measure affective and physiological reactions of the Autonomic Nervous System share concerns of firstly privacy, and secondly, the overreliance on information due to an illusory accuracy and objectivity. She states that even though brain waves do not lie, neither do they tell the truth. Following Farrah's trajectory we offer that like brain waves, empirical measurements of physiological responses should be interpreted with caution. There is not necessarily a direct correlation between the empirical data and the personal experience. Researchers should not allow the impression of accuracy and objectivity provided by the quantitative data to overshadow subjective experiences, nor should the quantitative and qualitative information be directly equated.

Norton and Asmundson (2003), in studies conducted to assess the effect of pain-related fear, describe physiological arousal as being characterized by accelerated heart rate, elevated blood pressure, increased respiration, gastrointestinal activity, increased muscular tension, and increased circulation to skeletal muscles as well as dermal and cerebral vasoconstriction. This suggests that the phenomenological experience may correlate with empirical responses. In this study responses may coincide with a general understanding of arousal, but equally, may include recordings of suppression, such as slowed-down heart rate or a decreased level of micro sweating. D'Mello et al. (2007), in studies about affective trajectories during complex learning, refer to changes in physiological arousal when affective states such as boredom, flow, confusion, frustration, delight and surprise are experienced. This study will reflect artists' actual affective descriptors such as irritability, excitement, and so forth.

## **Previous research**

Hergenhahn (2009: 250) suggests that the difference between what is physically present and what is experienced psychologically has been agonized over for centuries. Indeed, it was this discrimination that had caused Galileo Galilei (1564-1642) to state that psychology could not be viewed as a science, and David Hume (1711-1776) to conclude that the physical world could not be known with certainty. Immanuel Kant (1724-1804) and Hermann von Helmholtz (1821-1894) stated that the mind tended to embellish sensory experience, and later developed theories of inference. Thus, the notion is not new that research as to the lived experience (such as art

making) expressed as science, is viewed with circumspection. “Ernst Heinrich Weber and Gustav Theodor Fechner were the first to measure how sensations vary systematically as a function of physical stimulation” (Hergenhahn 2009: 251), and could thus be viewed as the founding fathers of experimental psychology.

Silvia (2005:342) states that emotions and art are intimately related. Whereas this statement may seem overly obvious, “[T]he study of art and the study of emotions, as areas of scientific inquiry, both languished during much of the last century. It is not surprising that the behavioral emphasis on observable action over inner experience would lead to a neglect of research on aesthetics”. In a review of developments vis-à-vis emotional responses to art, the same author (2005) explains that both art and emotion resurfaced in psychology at about the same time during the 1960s and 1970s, as psychologists began developing theories of basic emotions<sup>1</sup> and experimental studies<sup>2</sup> were conducted focusing on hedonic qualities of art. “Since then, the psychology of emotion and the psychology of art have had little contact” (Silvia, 2005:342). A breakthrough in the study of emotional responses to art, which did not include recorded responses of art making, came about with Daniel Berlyne’s “new experimental aesthetics” in the 1960s and 1970s – the development of a tradition in research on art which emphasized controlled laboratory research involving advanced behavioural science methods. In short, Berlyne’s experiments, which typically included skin conductance, revealed over time that the hedonic qualities of artistic stimuli were traced to changes in arousal, and that the hedonic qualities of art came from two biological systems of reward.<sup>3</sup> Research since then has indicated that markers of arousal are decoupled within different arousal measures, such as electro-dermal and cardiovascular responses; and also within the same system, such as low correlations among heart rate, systolic blood pressure, and diastolic blood pressure (Sylvia, 2005). In other words, increased heart rate, for example, does not automatically follow increased respiration rate, and so forth. The same author suggests, further, that emotions are not merely states of high arousal, but rather that emotions arise from subjective appraisals of events. He conducted various experiments in which he applied an ‘appraisal model’ to the study of artistic expertise and concluded: “[I]f people with training in art find some kinds of art more interesting, then it must be because they are more likely to appraise the art in ways that generate interest. Knowledge about art will affect the emotional experience of art” (Sylvia, 2005: 347). The latter statement is significant in how it has influenced subsequent research, but will not be explored in this article. With regard to art making and quantitative research in general, and physiological activation in particular, there had been no further significant developments, yet quantitative research of physiological response and sport started to pave the way for other disciplines.

An interest in sport performance can possibly be explained by its inherent competitiveness and general popularity. Furthermore, physiological responses in sport can be measured against sporting outcomes (Filho & Moraes, 2008). This is not the case with art making, which is not measurable against performance outcomes per se. Whereas much research on sport performance is based on imagining outcomes (for example imagining a perfect golf swing as opposed to actually performing it), Dietrich (2008) cautions against relying on such research. He explains that imagined and actual motion do not share the same neural substrates, nor does imagining an action correspond to a subliminal activation of the same brain areas required for its execution.

We suggest that research on art making and commensurate physiological activation is scant for much the same reasons – body movement causes unreliable data readings, and such readings cause, and are referred to, as artifacts. Quantitative research in creativity using neuroimaging have included studies in art making, where art making and creativity are used synonymously (Dietrich & Kanso 2010) - note that the authors do not necessarily subscribe to such a view. In

reviewing the entire literature that relates creativity to brain activity (1,910 in total), Dietrich and Kanso (2010), after pruning down the list of brain imaging studies on creativity to 72 experiments reported in 63 articles published until February 2010, show that creativity, in all genres, "... simply cannot be captured with any of the relatively coarse theoretical proposals currently in circulation...". Of these 63 articles reviewed by Dietrich & Kanso (2010), the following used art making activities in experiments: Jung, Segall, et al (2009), where MRI: proton spectroscopy was employed; Martindale et al (1984), where EEG was employed; Petsche et al (1997), where EEG was employed; Bhattacharya & Petsche (2005), in which EEG was employed; Solso (2001), where fMRI was employed; Kowatari et al (2009), where fMRI was employed. The low representation of art making experiments could be due to the general restraint on head movement allowed, after which artifacts are produced (and recorded unless specifically programmed to eliminate such) utilizing the above neuroimaging methods. No quantitative experiments were reviewed where physiological responses were recorded using methods such as peripheral skin temperature, electrodermal responses (or skin conductance), heart rate (blood-volume pulse), and respiration. There were also, noticeably, no reports on multimethods studies, incorporating both empirical as well as experiential research methods.

The motivation to do research is usually due to a problem that requires elucidation or solving. Previous qualitative studies of artists' perceptions of the art making experience coupled with physiological activation have been documented in research on art making and healing, especially in the treatment or rehabilitation of cancer patients (Lane 2005a; Lane 2005b; Lane 2008), or in the treatment of chronic pain (Norton 2003). Lane (2005b) states that, from a healing perspective, when people engage in creative work, it alerts parasympathetic activation. "Heartbeat slows, blood pressure drops, breathing slows, blood goes to the intestines, and the body shifts into deep relaxation" (Lane 2005b: 122). This study has taken cognizance of prior studies in order to establish best practice, yet the combination of methods employed in this particular study have, to our knowledge, hitherto not been recorded and published.

## **Materials and methods**

**Participants:** In order to narrow the potential for variability, the sampling population was homogenized as far as possible. Three experienced, middle-aged artists participated in this study. They were identified as artist A (AA); artist B (AB), artist C (AC).<sup>4</sup> They were deemed experienced artists, with individually, no less than 35 years of professional art making experience. Prior to conducting the experiments, semi-structured interviews were conducted to establish relevant aspects regarding their subjective experience of the quality of their art-making experience.<sup>5</sup> In order to limit variables, all three produced two-dimensional artworks, either through drawing or painting (whilst standing or sitting at an easel). If the artist was sitting during the first session, the artist was requested to sit during the remaining sessions. The same applied to the artist standing during the first session. This was determined by their personal preference as well as the size, style and genre of the artwork. All participants underwent three sessions during which physiological responses were measured and recorded through non-invasive quantitative physiological assessments, specifically electro-dermal response (also referred as skin conductance), peripheral skin temperature,<sup>6</sup> respiration and heart rate. For each session, a pre-baseline was established by recording the artist-participant 'at rest' for a duration of 70 seconds<sup>7</sup> immediately prior to the commencement of the artistic activity, followed by an active drawing or painting phase of 30 minutes, followed immediately by an post-baseline of 70

seconds 'at rest'. The Thought Technology ProComp Infinity 8-channel system and equipment were used for all recordings. A studio of personal choice was used for each artist-participant. The same studio per artist-participant was used for all three his/her sessions. Each participant's sessions took place during more or less the same time of day.

Experiential investigations of artists' reflections: The investigative question in conducting semi-structured interviews was to establish whether artists' subjective, affective and/or physical descriptions of the art making experience had any correlates. Lane (2005a: 286), refers to Max van Manen's hermeneutic, phenomenological method of research concerning the lived experience, which she refers to as preceding scientific schematization. The phenomenology posture "...is one of a perpetual beginner, which means the researcher takes nothing for granted". It is from such a premise that semi-structured interviews were conducted in this research, where the artists' experiences were documented with regard to perceptions of the art making experience as a life choice, as well as perceptions before, during and after art making sessions where physiological experiences were recorded. In their hermeneutic phenomenology investigations, Ajjawi and Higgs (2007) explain that the semi-structured interview format provides the advantages of both structured and unstructured interviews. Semi-structured interviews allow for greater scope and depth, especially considering the intimate, and often layered nature of narrating the art making experience. The interviews, which lasted one to two hours, were conducted in a place chosen by the artist and recorded in writing by the interviewee. The types of semi-structured questions that were asked "...facilitated the likelihood of people responding with stories and memories of body sensations, rather than with intellectual theories" (Lane, 2005a: 287). The formal list of questions was: "You have chosen art teaching and art making as a life profession, so we are not questioning the obvious. Are you aware of other possible reasons why you make art? Are you aware of any sensations – physical or emotional – before making art? During art making? After art making?"

Empirical measurements of physiological responses: The rationale for conducting the various non-invasive physiological assessments was to trace any possible changes in physiological responses when the artist is actively engaged in the art making process. The investigative questions were: is there a pattern emerging for each artist comparing idiosyncratic data collected from his/her three sessions; is there a potential pattern when comparing the outcomes of the three individual artists? The recordings and measurements reflect the complete physiological response profile of each of the participants during the pre-baseline (duration 70 seconds), the active phase (30 minutes) and the post-baseline (70 seconds). It is acknowledged that, due to movement involved in the active process, artifacts, thus "...the recorded noise that is created by a stray or unwanted signal that is not generated by the biological system being monitored" (Peper et al 2008: 407), will be present and influence the readings. In other words, in all physiological responses recorded during these experiments, there are two possible ways to interpret readings: 1) as a change in the autonomic nervous system; 2) as physical movement. We decided to interpret and present the data with the artifacts included as this provides a composite reflection of all the physiological responses, whether due to autonomic nervous system activity, or movement (thus artifacts) during the active process. We further acknowledge that this can provide a skewed reading of autonomic nervous system activity.<sup>8</sup> It should, however, be emphasized that the movement used by an artist during painting or drawing activities will remain more or less the same during each session of art making. As such, artifacts will be more or less the same during each active phase. It is important to remember that the human body as a psychophysiological construct is constantly in a state of flux. If the emerging pattern is indicative of increased activity, it merely indicates that during the time of the particular measurements, in the body's search for homeostasis, there was relatively more increased than decreased activity.

Electro-dermal response: A way to measure a subject's autonomic response is to monitor the degree of 'micro sweating' or the changes in sweat gland activity – "...the moment-to-moment fluctuations in the electrical resistance of your skin" (Ramachandran, 2011: 70). Peper et al. (2008: 162) indicate that the more intense the activity, the higher the sweat gland activity and thus the higher the skin conductance. The skin conductance report (SCR) is as such measuring an autonomic reaction and is linked to an affective experience. Ramachandran (2011: 70) explains that when something that is emotionally evocative is viewed, the amygdala signals the hypothalamus to prepare the body for action.

This fight-or-flight reaction is not all or nothing; it operates on a continuum. A mildly, moderately, or profoundly emotional experience elicits a mild, moderate, or profound autonomic reaction, respectively. And part of these continuous autonomic reactions to experience is microsweating: Your whole body, including your palms, becomes damper or dryer in proportion to any upticks or downticks in your level of emotional arousal at any given moment.

The skin conductance measurement is done by taping two passive electrodes to the skin in order to monitor electro-dermal response. In this specific project, we placed the skin conductance electrodes on two noncontiguous fingers, on the non-dominant hand thus not interfering with the movement of the artist-participant's dominant hand activities. The unit of measurement is micromhos.

Peripheral skin temperature: Peripheral skin temperature was measured through the use of a thermistor (Peper et al. 2008:108) being placed on the "pulp of the distal portion of the little finger" (Thompson et al. 2003:231). The more relaxed a person is the higher the skin temperature can be, the more stressed or excited, the lower the skin temperature. These changes in the peripheral skin temperature are due to the effect of the nervous system on the arterial blood vessels i.e. in a tense situation the sympathetic nervous system causes the "arterial blood vessels in the finger to constrict" (Thompson et al. 2003:231). This thermoregulatory process is one of the core aspects of homeostasis (Saladin 2012:1025; Peper et al., 2008:110). The measurement of peripheral skin temperature provides a good indication with respect to the "blood flow through the vessels under the skin" (Peper et al. 2008:107) – these vessels are also known as the arterioles. An increase in sympathetic nervous system activity decreases blood flow and as such skin temperature, whereas a decrease in sympathetic activity increases blood flow and skin temperature (Ibid: 108). Similarly, an increase in parasympathetic activity is indicative of a sense of general relaxation and an increase in skin temperature. Cognitive activity stimulates the sympathetic nervous system and thus leads to hand cooling (Ibid:109).



**Figure 1**  
**A non-dominant hand ready for measuring physiological responses**  
**(photograph: the authors).**

Heart rate: A state of arousal is reflected in a higher heart rate and a state of relaxation is reflected in a lower heart rate (Thompson et al. 2003: 298). The same authors further posit that increased heart rate and skin conduction may "...be related to improved attention and short-term memory" (Ibid: 232). Low body temperature may slow the heart rate down. Heart rate is measured as beats per minute. For this project, heart rate was determined by measuring the blood volume pulse, which is done through the use of a plethysmograph with a photoelectric transducer (Ibid). The sensor, which makes use of an infrared light, measures "changes in the blood volume in the arteries and capillaries that correspond to changes in the heart rate" (Peper et al. 2008: 284). During this project the sensor was attached to the middle finger of the non-dominant hand.

Respiration: Respiration rate can reflect a person's holistic state of well being. A person's respiration rate is determined by placing at least one, but preferably two strain gauge sensors around the trunk. More specifically one sensor is placed directly under the arms to measure the rate and displacement of the thoracic area and the other is placed on the area where most expansion is observed in the abdominal region (Peper et al. 2008:227). The movement of the gauges is calibrated to reflect the rate of breath per minute (Ibid). Thompson et al (2003: 232) indicate that the breath rate is in an interrelationship with the "partial pressure of CO<sub>2</sub> in the blood stream". The less carbon dioxide (which is a waste product of the body) in the blood, the slower the rate of breathing and the more relaxed the person. Various breath rates and rhythms reflect various emotional states (See Bloch et al. 1995:202-203; Bioten 1998).



**Figure 2**  
The thoracic and abdominal areas ready for measuring respiration rate  
(photograph: the authors).

### **Discussion of results**

In order to discuss the results, we consider firstly, the idiosyncratic data pertaining to each artist, and secondly, we consider patterns as they emerged from data pertaining to all three artists.

Semi-structured interviews: It should be noted that the interviews were conducted prior to any experimentation. Thus, all responses are affective descriptors of perceptions based on previous (and ongoing) art practice, and integral to the lived experience. The first formal question was: “You have chosen art teaching and art making as a life profession, so we are not questioning the obvious. Are you aware of other possible reasons why you make art?” The purpose of this question was primarily to set the interviewee at ease; to set down his/her context for making art. It was thought that more detailed questions that followed, would flow from such a context, and thus not seem to be directly invasive of a practice which is highly personal and intimate. What follows is firstly a verbatim response from each artist (respectively AA, AB and AC), followed by an extraction of key words best describing his/her affective experience. Thereafter, overlapping key words extracted from all three artists are offered.

AA: It’s a creation thing. Before there is nothing, then there is something! I’m doing what I’m meant to be doing. I can manufacture landscapes that don’t exist – I can magnify and shrink things, it’s endless. I’m manipulating reality. I can do anything and even make dreams happen. What I make is unique to me – nobody else has thought of this or done this. I therefore make history. I make art for a selfish reason – it’s MY personal thing, where nobody can criticize me – the art is there as validation. It makes me feel good, and centred, balanced.

**Key words AA:** The overriding reason for making art is to reaffirm a sense of control; to make something where there was nothing; to feel good; to reaffirm a state of uniqueness.

AB: It makes me feel as if I'm in control. It is like therapy - it calms me down and makes me feel good. When I mix colours it brings serenity, and there is huge satisfaction in watching colours dry and how they change. It is like engaging in mystery, creating mystery. It also gives me a sense of excitement - I feel energised! I do it for sharing – for people to realize something, for them to respond to the artwork. It therefore brings meaning to my life – it brings validity to the ordinary in life.

**Key words AB:** The overriding reason for making art is to reaffirm a sense of control; to bring meaning to the artist's life; to share the product with others; to feel good.

AC: For me it's less about what I am specifically doing, but rather like a place that I go to – that I need to go to – where I can shut off from the world. I'm rather cynical, but here is one 'space' where I can make magic – something that doesn't and hasn't before existed. It is good for me – a sacred place where I can go and emerge feeling good, sometimes for a long time.

**Key words AC:** The overriding reason for making art is to make something where there was nothing; to shut off from the world; to feel good. A comparison of key words used by AA, AB and AC reveals that all three artists make art predominantly to feel good; to make something where previously there was nothing. The second question was: Are you aware of any sensations – physical or emotional – before making art?

AA: Impatience to get going – sometimes feel irritable inside, even upset. Firstly I need to create order – prepare for it and that requires effort to reach that point. I first have to complete chores. This is a ritual – like preparing for sacred time where I won't be disturbed in the space I create to be focused in.

**Key words AA:** Affective descriptors are feeling irritable, upset.

AB: It's like a negative irritability, even a depressed feeling – as if I'm being withheld from access to the process. I sometimes feel stubborn towards myself – there is often an anticipation of failure, which doesn't happen.

**Key words AB:** Affective descriptors are irritability, depressed.

AC: I can't wait to get it going. I sometimes feel deprived and out of kilter.

**Key words AC:** Affective descriptors are impatience, deprivation. A comparison of keywords used by AA, AB and AC reveals that during the preparatory phase, or before art making commences, all three artists described the affective experience as either irritability; impatience; or being upset. The third question was: Are you aware of any sensations – physical or emotional – during art making?

AA: It feels as if it could go on forever. I override bodily awareness until I know I have to stop due to outside 'stuff', or perhaps light fails. Yes, outside circumstances force me to stop. I feel a calm energy whilst making art. The challenge keeps you there – you are in the 'here and now'. You are making mystery. It is a good feeling, even though it can feel like you're walking a tightrope – pushing the envelope. It is like seeing beyond the labyrinth – it takes you to an elevated level.

**Key words AA:** Affective descriptors during art making are feeling challenged, calm, overriding bodily discomfort, elevated.

AB: For me there are two phases: The first is meditational, somewhat mindless, like a ritual, no commitment to (re)solving a problem. It feels challenging. I spontaneously work with colour, intuitively, 'hands-on'. Then it shifts to a planning mode. Now there's no turning back. There's no judging. I forget about my body, excepting when I experience pain. I'm aware of challenges. During

this phase I'm often aware of invoking other energies, other people, artists. It is exploring the new, creating something unique. I have a sense of pushing the envelope – what I do must be fresh. I feel a sense of freedom and I feel sharp!

**Key words AB:** Affective descriptors during art making are feeling mindless, challenged, intuitive, overriding bodily sensations, explorative, feeling free and sharp.

AC: It's like coming home. Yesyesyes., everything feels as if it is falling into place. I often get a sense of a perspective on the greater scheme of things – somehow holistic – the 'small stuff' falls away. I feel safe – it's just me. I feel utterly focused, sharp as a razor, yet strangely not quite in control. I feel excited when things start taking shape. I'm often unaware of the duration of time and can continue until I NEED to stop.

**Key words AC:** Affective descriptors during art making are perspective on things, holistic, safe, focused, sharp, not in control, unaware of duration of time. A comparison of key words used by AA, AB and AC reveals that during the art making, all three artists described the affective experience as feeling challenged; calm; overriding bodily discomfort; elevated; intuitive or holistic; focused; free or not quite in control. The fourth and last question was: Are you aware of any sensations – physical or emotional – after art making?

AA: I feel calm satisfaction; calm accomplishment. However, I sometimes feel peeved if I have to stop. It is a unique feeling – there's no competition with anybody. A sense of peacefulness. Gratefulness. Sometimes the next picture comes into my head. Generally it feels like a ritual that has run its course – it gradually dies down.

**Key words AA:** Affective descriptors after art making are satisfaction, accomplishment, peacefulness, gratefulness.

AB: I feel a sense of satisfaction; justification. I feel a sense of being rewarded and well-being. I feel special and autonomous.

**Key words AB:** Affective descriptors after art making are satisfaction, justification, sense of well being, feeling special.

AC: I feel totally calm, yet often energized. It feels as if I have perspective on things. Yet, I can feel excited because there is now a link to the artwork – a relationship is established.

**Key words AC:** Affective descriptors after art making are a sense of calm and perspective, feeling energized, excited. A comparison of key words used by AA, AB and AC reveals that after art making all three artists experience a sense of satisfaction; peacefulness; calm or well being.



**Figure 3**  
**An artist during an art making session**  
**(photograph: the authors).**

Experiments: As indicated earlier, the investigative questions were: is there a pattern emerging for each artist comparing idiosyncratic data collected from his/her three sessions; is there a potential pattern when comparing the outcomes of the three individual artists? In order to answer the first question, a detailed report was done vis-à-vis average measurements of heart rate, respiration rate, skin conductance and peripheral skin temperature. These reports compare ‘pre-baseline’ measurements with ‘during’ measurements; ‘during’ measurements are compared with ‘post-baseline’ measurements; ‘pre-baseline’ measurements are then compared with ‘post-baseline’. It is important to note that during the pre-baseline phase the artist was requested to remain still but to move open eyes over the canvas/paper; during the active phase, there was eye and body movement; during the post-baseline phase, there was again no bodily movement, yet there was eye movement at will. With regard to a comparison of measurements, it should be noted that any shift, regardless how big or small, was categorised as either an increase or a decrease in order to trace possible patterns. Some of these shifts can be seen as too small to be of any significance. As stated, these readings are indicative of physical movement (thus an artifact) as well as autonomic nervous system activity. Proceeding to the second investigative question, the artists’ profiles were then compared.<sup>9</sup>

Correlations: Artists’ descriptions of perceptions before art making can be summarized as follows: impatience; irritability; and feeling upset. An average of three experimental recording sessions per artist was done for 70 seconds before art making commenced – referred to as ‘pre-baseline’. Artists’ perceptions whilst actively making art (referred to as ‘during’) were: feeling

challenged; unaware of bodily discomfort; feeling elevated, holistic; focused. This study does not provide a direct correlation between such perceptions and experimental readings, yet we take note of the following when comparing the individual pre-baseline and during average profiles: Heart rate average compared amongst artists – six out of nine potential shifts between pre-baseline and during measurements reflected an increase in heart rate. This indicates that when comparing the pre-baseline measurements of each of the artists with the during measurements, that heart rate average (which reflected marginal to minimal changes) during the active phase of all three artists, had more moments of faster heart rate than slower, compared to the pre-baseline phases. The increased heart rate average reflects more activation and is potentially more indicative of activity of the parasympathetic nervous system. Respiration rate average amongst artists – eight out of nine potential shifts between pre-baseline and during measurements reflected an increase in respiration rate. The increased respiration rate may be indicative of more excitement, as all three artists appeared to move from feeling irritable; impatient, to feeling challenged, elevated, or focused. It may also reflect more physical activity (which of course it did, as all three artists started drawing or painting) and thus on a physiological level a need to breathe faster – which will here be categorized as an artifact. On the other hand, if a decrease in reading is observed, it is indicative of the artist experiencing a sense of calm, or as expressed by the artists, a sense of holism, feeling focused. Skin conductance average amongst artists – eight out of nine potential shifts between pre-baseline and during measurements reflected an increase in skin conductance. Skin conductance average minimum increase reflected five out of the nine times and a decrease four out of the nine times. Skin conductance average maximum increased nine out of the nine times. An increase in skin conductance reflects activation of some kind. The skin conductance average minimum increase is evident of overall more arousal than suppression during the ‘during’ than the pre-baseline phase. The skin conductance maximum increase possibly reflects more intense arousal moments. Peripheral skin temperature average amongst artists - six out of the potential nine shifts between pre-baseline and during measurements reflected a decrease in peripheral skin temperature. Peripheral skin temperature average minimum decreased nine out of the potential nine times. Peripheral skin temperature average maximum increased eight out of the nine times. When comparing the pre-baseline measurements with the during measurements of skin temperature, skin temperature minimum and skin temperature maximum correlate – this possibly indicates more activity and more moments of more intense excitement. The increased activity of the sympathetic nervous system resulted in the decrease of the peripheral skin temperature. The decrease of the minimum and increase of the maximum peripheral skin temperature average reflects a wider swing in the flux of sympathetic and parasympathetic activity, although all over, the moments of sympathetic activity possibly overshadowed the moments of parasympathetic activity during the active phase.

Comparing the individual ‘during’ (described by artists as feeling challenged; unaware of bodily discomfort; feeling elevated, holistic; focused) and ‘post-baseline’ average profiles (described by artists as feeling satisfied; peaceful; calm, sense of well-being): Heart rate average compared amongst artists – five out of potential nine shifts indicated an increase in heart rate average. The overall pattern indicates that with reference to heart rate, the artists experienced an increase in excitement during the post-baseline phase more often – this could indicate that the phase of excitement (as described by artists during art making) requires more time to ‘calm down’ after art making has physically stopped (recall also that two of the three artists indicated that they often start thinking of the next art work, or experience a bond with the current art work, after they have stopped working). Respiration rate average amongst artists – eight of the potential nine shifts indicated a decrease in respiration rate average. Slower respiration rate is indicative of a more relaxed and calm state (again borne out by descriptions of artists as to how

they tend to feel), and thus possibly reflects an increase of parasympathetic activity. It also has to be taken into account that there was no physical movement in the post-baseline phase. Skin conductance average amongst artists – six out of the nine potential shifts indicated an increase in skin conductance between the during and post-baseline average profiles. Skin conductance average minimum increase was nine out of the nine times. Skin conductance average maximum decreased six out of the nine times. An increase in skin conductance reflects arousal of some kind – the artists were all more excited, even though at this stage they were not moving at all, but rather just observing the art work that had been done. Thus, this indicates that all activity was due to sympathetic arousal. There was thus a smaller flux between arousal and suppression activities. Peripheral skin temperature average amongst artists – six out of the nine potential shifts indicated a marginal increase in peripheral skin temperature between the during and post-baseline average profiles. Peripheral skin temperature average minimum increased eight out of the potential nine times. Peripheral skin temperature average maximum decreased marginally eight out of the nine times. An increase in peripheral skin temperature reflects increased relaxation (again borne out by what the artists described). The increased peripheral skin temperature average minimum and decreased peripheral skin temperature average maximum indicate a narrower flux between arousal and suppression activities.

Comparing the individual ‘pre-baseline’ (described by artists as impatience; irritability; and feeling upset) and ‘post-baseline’ (described by artists as feeling satisfied; peaceful; calm, sense of well-being) average profiles: Heart rate average compared amongst artists – seven out of the potential nine shifts indicated an increase in heart rate between the pre-baseline and post-baseline average. The tendency observed in the overall heart rate profile is thus more arousal reflected in the post-baseline average than in the pre-baseline average – again this could be ascribed to more time being required to ‘calm down’ after art making phase has been completed, and visually engaging with the art work in front of them. Respiration rate average amongst artists – five out of the potential nine shifts indicated an increase in respiration rate between the pre-baseline and post-baseline average. The tendency observed in the overall respiration rate profile is more arousal reflected in the post-baseline average than in the pre-baseline average. Skin conductance average amongst artists – nine of the potential nine shifts indicate an increase in skin conductance between the pre-baseline and post-baseline average. Skin conductance average minimum increased eight out of the nine times. Skin conductance average maximum increased marginally to significantly nine out of the nine times. The tendency observed in the overall skin conductance profile is more arousal reflected in the post-baseline average than in the pre-baseline average. Both the minimum and maximum skin conductance average increased, thus reflecting a more aroused state in the post-baseline average than in the pre-baseline average. Thus, this indicates that, as there was no physical movement, the arousal noted was due to sympathetic arousal alone. Peripheral skin temperature average amongst artists – five out of the nine potential shifts indicated a marginal decrease in peripheral skin temperature between the pre-baseline and post-baseline average profiles. Peripheral skin temperature average minimum decreased marginally six out of the potential nine times. Peripheral skin temperature average maximum increased seven out of the nine times. The tendency observed in the overall peripheral skin temperature profile is more arousal reflected in the post-baseline average than in the pre-baseline’ average. The overall minimum peripheral skin temperature average decreased and the overall maximum peripheral skin temperature average increased, indicating more intense arousal and suppression responses.

## Conclusion

In our introduction, we conceded that there is not necessarily a direct correlation between the empirical data and the personal experiences of artists described in this study. As researchers commencing from a phenomenology posture, we have, indeed, taken nothing for granted. We further conceded that researchers should not allow the impression of accuracy and objectivity provided by empirical data to overshadow subjective experiences. With regard to art making and quantitative research in general, there have been very few research mechanisms to follow, especially since the production of artifacts remains a factor to take into account in research where bodily movement is involved.

In this study the empirical data was comprised of 24 recording phases, of which five conclusively overlapped for all three artists – thus indicating significant patterns or ‘tendencies’ relevant to this research. In our pre-baseline to during recordings temperature minimum decreased and skin conductance maximum increased. We can thus conclude from the empirical data that there was more physical activity, and evidence of more moments of excitement due to sympathetic arousal. This correlates with artists’ perceptions of feeling challenged, elevated and not quite in control when making art. Directly after art making, skin conductance minimum increased which indicates that the artists were still excited after the art making phase. Comparing the moments before art making to moments directly afterwards, skin conductance average and maximum readings increased. This indicates that all three artists were more excited after the art making session than when they started.

The shortcomings of the methods employed in this research can be summarized as follows: since we generally worked with averaged readings and results, increase and decrease shifts in physiological activation were often negligible, yet were taken into account. This can be overcome in future by adapting the research methodology by triangulating real time measurements of, not only the physical responses, but also real-time video recordings of the active art making process. Furthermore, markers should be placed on the recordings when the artist uses one or more of a selection of key words to describe his/her affective experience, during the recording process.

This study was not intended to be conclusive, but rather to contribute towards an ongoing longitudinal study. Findings from this study will form new baselines for future research. Rose (2003: 378), when referring to the brain and memories offered “...that they need not be lost even if they cannot be found; they may be difficult to access because we can’t find a key to how we have classified them, because we need a cue to recover them...”. The authors are of the view that searching for correlates between descriptions of affective experiences and physiological reactions is much the same – it is as if we have not yet found the key to how we can classify them. It is with a mixture of excitement and trepidation that we are, in effect, joining a queue of many people who have pondered this question from as far back as Aristotle (384-322 B.P.).

## Notes

1. For more on developments in psychology vis-à-vis emotions see Aristotle (384-322 B.P.); Plato (ca. 427-347 B.P.); Democritus (ca. 460-370 B.P.); Baruch Spinoza (1632-1677); John Locke (1632-1704); David Hartley (1705-1757); David Hume (1711-1776); Charles Darwin (1809-1882); William James (1842-1910); Edward B. Titchener (1867-1927); William McDougall (1871-1938); Carl G. Lange (1834-1900); John B. Watson (1878-1958).
2. For more on experimental psychology see Charles Bell (1774-1842); François Magendie (1783-1855); Ernst H. Weber (1795-1878);

- Gustav T. Fechner (1801-1887); Hermann von Helmholtz (1821-1894); Wilhelm M. Wundt (1832-1920); Franz C. Brentano (1838-1917); Edmund Husserl (1859-1938); Hugo Münsterberg (1863-1916); Mary W. Calkins (1863-1930); Robert S. Woodworth (1869-1962); Clark L. Hull (1884-1952).
3. For more on these biological systems of reward, see Berlyne, D.E., 1967. *Arousal and reinforcement*. In Levine, D. (ed.), Nebraska symposium on motivation, 15: 1-110. Lincoln: University of Nebraska Press. Also see Berlyne, D. 1971. *Aesthetics and psychobiology*. New York: Appleton-Century-Crofts.
  4. A research project in which the physiological states of three archers were recorded was used as a candidate mechanism (Filho & Moraes, 2008).
  5. A potential conflict of interest is noted: one of the authors was also a participant. Interviews and experiments were coded so as to ensure objectivity in interpreting the results.
  6. Also known as 'shell temperature' (Saladin, 2012: 1025).
  7. Thompson & Thompson (2003: 244) indicate a 1- 3 minute baseline recording.
  8. Numerical recordings with commensurate descriptions are copious. These are available for perusal from the authors.
  9. The authors express their sincere gratitude to Dr Chris Steinmann from University of Limpopo, vis-à-vis caution when interpreting quantitative results.

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