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From *Her* (2013) to *Viv the Global Brain*

Becoming Material, Unfolding Experience through Radical Empiricism and Process Philosophy

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Abstract

This paper reflects upon the methodological questions entailed by what digital media materiality *could be, and how one could analytically approach it via theories of experience such as radical empiricism and process philosophy. I argue that for digital media, becoming material means to 'enter into experience'. However, this notion of 'experience' is not defined in relation to the phenomenological, distinctly-human subject. I offer instead an expanded notion of experience that resides in non-human objects, networks and other physical entities like mobile phones and computers. Operating system (OS) and intelligent assistants such as* Samantha *in Spike Jonze's* Her *(2013) and the next-generation* Siri *in development,* Viv the Global Brain, *can be seen as representations of what such a non-human experience could be like, as digital objects communicate with one another. William James, father of radical empiricism, argues that the definition of matter as something that lies behind physical phenomena is merely a postulate of thought. In his philosophy, the world is made up of only one primal material – that of experience. While James could not have anticipated our era of digital technologies at the time of writing in 1890, radical empiricism offers an interesting angle in approaching what digital materiality could be. Mark Hansen's latest monograph,* Feed Forward: On the Future of Twenty-First-Century Media *(2015), turns to Alfred North Whitehead in an attempt to understand how 21st-century media operations feature in a world of objects where humans are implicated in, but not central to digital networks. Referring to Whitehead, he analyses how media operations (like those superalgorithms computing in OS systems) reconfigure the notion of perception in experience. In a similar theoretical move, I turn to William James's radical empiricism to analyse how the digital may be material/ised in a world of beyond-human experience.*

Introduction

Spike Jonze's *Her* (2013) tells the story of the romance which unfolds between *Samantha*[1] – a new, smart operating system (OS) which functions like a 'consciousness'[2] – and her user *Theodore*, a lonely urbanite who writes love letters for other people for a living. *Samantha* uses 1/200 of a second to read through a book of names to pick one for herself when *Theodore* asks for her name. She sorts through his emails, organises his system files, proofreads his work and before long, the two share intimate conversations, dates and even sex. There is no doubt that *Samantha* is very much experienced as a real entity even though she does not have a human body.

This filmic exploration of what OSs can do is closely connected to current technological developments. *Viv the Global Brain* project attempts to build an OS which will recognise natural speech and carry out commands, and the level of operationality and functionality *Samantha* demonstrates is potentially a goal to strive for in the future. Such developments and phenomena, which integrate our daily lives with technological objects, demand a rethinking of theoretical concepts enabling us to understand and to grapple with these objects and their materialities.

This paper reflects upon the methodological questions entailed by what digital materiality could be and how one could analytically approach it via two theories of experience, radical empiricism and process philosophy. Following William James and Alfred North Whitehead, I argue that for digital media, to become material is to enter into 'experience'. This notion of 'experience', however, is not defined in relation to the phenomenological distinctly-human subject. I offer instead an expanded notion of experience that resides in non-human objects, networks and other physical entities like mobile phones and computers.

Why is it interesting to approach the material via the experiential? William James, father of radical empiricism, argues that the definition of matter as something that lies behind physical phenomena is merely a postulate of thought. In his philosophy, the world is made up of only one primal material and substance – that of experience. To suggest that matter and materiality do not exist a priori is his way of approaching the world in a non-dualistic manner. Matter and materiality do not only belong to objects, but are part and parcel

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1   The film anthropomorphises Samantha in a way by casting Scarlett Johannson's sensuous voice (rather than using a flat computer voice in the likes of Siri), and anyone who recognises this fact would likely associate the mental image of the actress to the operating system. However, what is interesting in this case is its exploration of what OS's are capable of, offering a glimpse into a potential future of how humans will interact with their gadgets as they become more and more integrated with our daily lives.

2   In the film, the promotion video for this type of OS is referred to as a 'consciousness'. The meaning of the reference will be unpacked and further explored in later parts of this text.

of what constitutes subjects. Experience is also not limited to what is tradi-tionally considered 'subjects' (i.e. human beings), but is something that can belong to anything and anyone. James separates 'experience' from the concept of 'consciousness' which assumes self-mastery over what one knows. Through this, he creates an expansive understanding of 'experience' without specifying who or what the 'experiencer' is. While James could not have anticipated our era of digital technologies at the time of writing in the 1890s, radical empiricism is decidedly non-human-centric in its definition of 'experience' and offers an interesting angle in approaching what digital materiality could be.

Another central figure in my account of 'experience' in digital materiality is Alfred North Whitehead. The notion of 'worldly sensibility', as elaborated by Mark Hansen in *Feed Forward: On the Future of Twenty-First-Century Media* (2015), is a central feature of Whitehead's process philosophy. Hansen describes how media today operate largely outside human perceptual consciousness, while shaping and influencing our sensations. Similar to James's non-human-centric mode of thought, Hansen through Whitehead demonstrates the becomings of digital objects, and the ways they influence the experience of (non-)humans in the ecology of network culture. Materiality and experience are aligned as a co-constitutive move in both radical empiricism and process philosophy. Digital materiality is not static matter lying behind digital objects, but is dynamic and comes into existence through experience.

In recent years there has been a resurgence of Whiteheadian thought within the domain of media studies, especially through the speculative turn (Bryant, Srnicek, and Harman 2011; Gaskill and Nocek 2014; Gratton 2014; Shaviro 2014). However, the significance of William James's thought in shaping White-head's work has not been brought to the fore,[3] nor has James been featured as a central figure within media philosophy. Adrian Mackenzie (2011), for instance, has attempted to make use of James's thought in studying the phenomenon of 'wirelessness' in contemporary network culture, using his ontology and plural conception of things and thought to map the nature of wireless networks. Brian Massumi (2013) connects James together with Whitehead and Gilles Deleuze to create an event ontology for the analysis of occurrent arts,[4] emphasising James's world of emergent experience, affects and sensations.

In the following, I take readers back in time to the 1890s when James is working on the question of consciousness without a subjective 'I'. This under-standing radically opens up an approach to 'experience' beyond the subjective body, and sets the stage for his later writings on radical empiricism. In this, he subsumes matter and materiality under the broader framework of experience. I then draw connections with Whitehead's processual metaphysics, elaborating on

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3 Isabelle Stengers has noted in her companion to Whitehead that he explicitly posi-tions himself as successor to James's work (2014: 150, 190).

4 Massumi proposes to think of all arts as *occurrent arts*. This is because "any and every perception, artifactual or 'natural', is just that, an experiential event" (2013: 82). In this sense, all arts can be events as they are happenings, and eventfulness may be attributed to art.

how dynamically experience traverses across human and technical objects. This will be closely observed in relation to Hansen's monograph on Whiteheadian media theory. My tracing of digital materialities through relations and sensations will be guided throughout with references to *Samantha* in *Her* and *Viv the Global Brain*, the next-generation *Siri*. This will enable us to think through the processes of digital non-human experiences in which these entities participate, which in turn materialises them. Thinking through the digital materiality of these OS systems not only enables us to analyse the valence of contemporary technology, but also opens up the opportunity to engage with post-human understandings of 'experience', generating concepts which will help us grapple with these latest developments in the digital age.

Radical Empiricism and Experience without Human Consciousness

How is experience understood within radical empiricism? As mentioned above, James approaches experience in a non-human-centric framework. In *Her*, when the OS product that brings *Samantha* into existence is first introduced, this is how it is marketed:

"Advertisement: An intuitive entity that listens to you, understands you, and knows you. It's not just an operating system, it's a consciousness. Introducing *OS ONE* – a life changing experience, creating new possibilities."

While this is intended as marketing language, *OS ONE* (or *Samantha*) can indeed be considered a consciousness without a human body. *Samantha* demonstrates not only the function of knowing and cognition, but also has reflections on her own thoughts and feelings. James argues that when such reflections happen, there is a coincidence with the thinking self, forming a distinctly-human activity. But the function of knowing, of registering what has happened, is a relation to which the 'human' does not lay exclusive claim. James distinguishes between consciousness and consciousness without the self ('sciousness'), a point which is similar to N. Katherine Hayles's discussion of the cognitive non-conscious (2014). This section will elaborate on the distinctions between the two and explicate how 'sciousness' functions.

James considers experience as the "primal stuff or material in the world, a stuff of which everything is composed" (1912: 11), the fundamental premise for radical empiricism. In other words, there is nothing outside of experience, and experience pre-exists language, concept and reflective thought. Experience has rich phenomenal content – James refers to it as the "thickness" of experienced reality in *A Pluralistic Universe* (1908). It is fine-grained and sensuously detailed, and is non-exhaustible in its continuous flow. Such thickness is to be contrasted with the 'thinness' of concepts and of thought. Conceptual analysis can only thinly attend to certain aspects of experience, and cannot account for the fullness of experience. James's understanding here already demonstrates

the limited capabilities of human minds in attending to the richness of 'experience' in the world, by pointing out how concepts and thoughts can only extract and focus upon thin aspects.

Experience exists as 'pure experience'. In Donald Crosby's explanation of James's work (2013), he makes use of the analogy of radio waves in order to make sense of the relationship between pure experience and the access into particular aspects of pure experience. While large numbers of radio programmes are broadcast in air, a radio only tunes into a particular channel to receive the stream of analogue sounds from one particular programme. If all are tuned in at once, only a "static-ridden cacophony of sound, that is, meaningless noise" (ibid.: 4) can be perceived. Pure experience can be compared to "a chaos of potential sensations and meanings and can be rendered into something actually meaningful to us only when we are able to select out aspects of it in particular contexts of inquiry, purpose, or use." (ibid.: 4-5) Pure experience is compared to a world of chaos,[5] where the human self and other organic and inorganic entities are carried over and in and out of streams of experience. In order for meaning to be generated, one needs to focus (via processes like perception and attention)[6] in order to select and render thinly parts which can create meaning. This is something understood to be a human capability, which exists as a function for the interpretation and selection of particular sections of experience out of a constant stream. James's understanding of experience is not exclusive to the human self, but rather he provides a worldly understanding of experience which is ontological in nature. Similar to Whitehead's ontology of the world as activity and process, James believes that the world is made up of experience.[7] By selecting aspects of it, one can trace and make sense of specific strands of activity and experience. Experience can unfold across different entities, and is not subjectified to a specific experiencer, a 'self' who experiences the world.

Through his earlier writings in *The Principles of Psychology* (1982) and his posthumous volume *Essays in Radical Empiricism* (1912), one can extract a two-step argumentation process in his reconfiguration of 'experience' and 'consciousness' where the 'self' implied by consciousness is disregarded. First, James argues that the self is only a correlate and that consciousness is better understood as 'sciousness', without the 'self' which exists a priori to such segments of experience. Second, he points out that experience is not separated into consciousness (the knower/the self) and content (the object out there).

Consider a scenario where one is deep in thought and conscious of one's engagement in thinking, but is suddenly interrupted by the sound of a phone

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5   Peter Gratton (2014) analyses how the material metaphysics of Elisabeth Grosz's work also takes chaos as a starting point. This enables her to establish a flat ontology for all forms of things and beings. See further Gratton (2014: chapter 5).

6   For further elaboration of experience as James describes it, see also Chapter 1 in Massumi and Manning (2014).

7   Brian Massumi elaborates on this connection in *Semblance and Event* (2011), and demonstrates how James's view of worldly experience and activity can be read together with Whitehead's view of process as ontology.

ringing. Upon retrospection, the impression of the moment would rather be characterised by the loud ringtone and the jolt it initiated, rather than on the inner constitution of the thinking body. Consciousness as an inner activity, in this sense, is disrupted, and one is tuned into the strand of experience where the sound from the environment takes centre stage. When a person is deep in thought, being conscious of the moment of thinking, the 'sciousness' of experience coincides with a self (hence con-sciousness). At other times, however, one may be taken along with other things in the environment ('sciousness').

"Instead [...] of the stream of thought being one of con-sciousness, 'thinking its own existence along with whatever else it thinks,' [...] it might be better called a stream of Sciousness pure and simple, thinking objects of some of which it makes what it calls a 'Me,' and only aware of its 'pure' Self in an abstract, hypothetic or conceptual way." (James 1891: 304)

James prefers 'sciousness' over 'consciousness' as a way to challenge the certainty of mastery of knowledge, which 'consciousness' seems to suggest. The ability to make sense of something is always an after-effect, which happens *after* the fact that the experience has already occurred. The sense of apprehension does not happen simultaneously with the moment of experience. When one's experience of thinking is taken over by the experience of loud sounds, human consciousness is not experienced in real-time and only exists possibly in the background.

James's consciousness is similar to what Hayles (2014) has termed the "cognitive non-conscious". Referring to both animal behaviour and technical objects, she discusses systems where cognition (knowing) takes place, but 'consciousness' and thinking are sidestepped.[8] Like beehive behaviour, non-conscious cognition functions upon simple rules that aggregate into complex modelling and performance of tasks, all of which does not necessarily require thinking. These systems, such as search engines, partake in the registration and knowing of occurrent experience, but do not engage in processes of interpretation and meaning-making. In her own words, "meaning has no meaning" (2014: 199) for the cognitive non-conscious. Hayles writes that "all thinking is cognition, not all cognition is thinking" (ibid.: 203). By focusing on the cognitive non-conscious in lieu of consciousness, she argues for a non-human centric approach to interpretation, going against the assumption that interpretation is an activity exclusive to a self with consciousness[9]. Similarly, James proposes that all consciousness involves 'sciousness' and knowing, but not all knowing requires the thinking and reflecting self in *con*-sciousness. In the example, the OS of *Samantha* in *Her* demonstrates both the ability to process data, and to reflect on her abilities, showing both moments where 'sciousness' and consciousness are at work.

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8   Hayles also makes passing reference to Owen Flanagan, a contemporary of William James, when discussing the dissociation with self and consciousness in such systems (cf. 2014: 203).

9   See further Hayles 2014: 217.

What is important to note here is that these moments of con-sciousness are but additional features to the cognition function to which any human or non-human entity can claim. James points out that experience has no inner duplicity where it is separated into 'consciousness' and 'content', i.e. experience does not occur under the scheme of consciousness as an a priori entity which perceives content. Rather, the function of con-sciousness adds to what is being acknowledged in cognition. In other words, thinking and reflecting processes are additional to the cognition process, rather than integral to it. The notion of experience from this perspective does not require consciousness, but operates through 'sciousness'.

Consciousness is only one possible 'section' happening within the larger stream of experience of the world where the particular section coincides with the 'me'/self. 'Sciousness', on the other hand, is framed as a 'witness' to happenings in time. As anecdotal evidence, Burkhardt et al. (1981) note that in James's own copy of *The Principles of Psychology*, he has provided a handwritten annotation next to the word 'sciousness': "The Witness" (1981: 1149 as quoted in Bricklin 2003: 86). Within the framework of the digital, this witness could be any entity from a thinking human to a processing algorithm.

As mentioned above, James designates 'experience' as the ontological substrate of the world. In such an account, James equates 'thing' and 'thought' as both parts of the continuum of 'experience'. Rather than suggesting that the world is made of matter, he suggests that the world is made of experience. He states that "Thoughts in the concrete are made of the same stuff as things are" (1912: 28). Within radical empiricism, James recognises that differences between thing and thought exist, but only qualitatively in relations, rather than in kind as two entirely different entities. This is important for understanding the import of radical empiricism for the notion of matter and materiality, and why 'matter' only comes as a postulate behind physical phenomena.

In his essay "Does Consciousness Exist?" (1904), James uses an example of the 'room' to illustrate how the content of thought and the actual world inter-sects, where the room in thought and the room in physical space are two sides of the same experiential coin. Picture the room you are sitting in. In your mind there is a thought of the room, perhaps a mental visual representation of the room or a sensation based on memories which took place in the room, and at the same time, there is a physical, tangible room in front of you. James explains that two trajectories take place within this room-experience: the personal biography of the reader and the history of the room itself. To you, the experience of the room is the combination of your "sensations, emotions, decisions, movements, classifications, expectations, etc." (ibid.: 16) of what the room is. To the room, the experience has "occupied that spot and had that environment" (ibid.) for as long as it has existed. Somewhere along these two trajectories, intersections occur where the personal experience coincides with the room's own material experi-ence, like a point on two lines

"[...] if the 'pure experience' of the room were a place of intersection of two processes, which connected it with different groups of associates respectively, it could be counted

twice over, as belonging to either group, and spoken of loosely as existing in two places, although it would remain all the time a numerically single thing." (James 1912: 21)

The reader is a witness to particular streams of experience in relation to the room, and the room bears witness to particular streams of experience available to it. James would suggest here that 'knowing' here establishes a kind of additive relation to the 'pure experience' of the world as a whole, where specific strands of experience have been highlighted. At the core of James's argument is a monist move which collapses the distinction between associating experiencer as subjects and the experienced as objects. What is experienced by the subject (the human), and what is experienced by the object (the room) as conventionally understood are simply different trajectories traced along the 'pure experience' of the world. The thing and the thought co-align through an intersection in these highlighted lines of experience by the two entities, the human and the room, showing how the two entities are both participants in the larger experience of the world. Experience itself as a continuous stream happens before the knowing function, the acknowledgement, or the processing function of the experiencer goes into action. Participation in the stream of experience precedes cognition, so in that sense experience can be claimed by any entity (a subject-object) as it continuously materialises in time and space. Under radical empiricism, what is materially accessible is the section of experience itself, one which does not necessarily belong to a particular subject nor object. Materiality then does not stand as an objective physical fact, but rather is processually accessed through an unfolding section of experience by subjects-objects.

I now turn to a machinic, digital example to see how James's ideas play out in a *Google* search in association with its *PageRank* algorithm.[10] How does a trajectory of experience unfold across a user and the engine and the search result? Consider the searcher who decides on several keywords he then inputs into *Google's* search engine, hoping to find a specific news article he has read before. Consider the search engine, with its access to a large database of data, and how it feeds results based on keyword queries. As the searcher browses through the search results, he clicks on the specific article he had in mind. Here the searcher's trajectory of experience is mediated through the search engine, which has provided results based on its past experience. *Google's* search engine records the decisions of other searchers through their clicks and uses that to determine the importance of the pages, thereby generating a repository of experiences, based on cognising and recording search behaviours. Through his search and selection of article, the *PageRank* algorithm then recognises that this combination of keywords suggests the search for this article. When a future

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10   *PageRank* feeds results based on the frequency that users visit certain webpages, and in principle it reflects the popularity of a particular website. In its design, the search engine mines the intelligence of those who select a particular link, and determines the importance of pages through the accumulative choices of users across the Internet. For further discussion of how the *PageRank* algorithm works, see Carr (2008).

user keys in a similar chain, this news article would likely appear higher in the search results page.

Put in James's vocabulary, the experience at hand is a repository amongst which all these, inter alia, may be found: this specific searcher's own experiences and ideas about it, the search engine's experience of having come across it, highlighted from a sea of other information like catalogues, links and advertisements. All of the above participate in the larger stream of pure experience in this particular digital world, and during the entire process, the search process has highlighted parts of past and current experience, and has manifested in such a specific search-result pathway.

Here the search engine functions as a 'sciousness' in James's terms. It establishes relations with the items found in its search results. Even though it arguably does not reflect upon what it has offered in its search results (which is what having consciousness does), it registers what has happened as a search history, and after the fact of the searcher's clicking, remembers and learns the preference of its user. The search engine materialises its effects through the unfolding of this experiential encounter with the searcher's query.[11] James's idea is that experience is additive – in the same act of *Google* search, the various entities (engine, user, web page) all have a different entry-point into the experience, each adding a different layer to the stream of experience at hand. To analyse the materiality of a digital entity, one must then trace the different sections of experience, engaging with the unfolding of its material pathways.[12] This materialisation is to be mapped across multiple entities, which all add to the strand of experience at large. A combination of conscious choice (that of link-clicking on the user end, for instance) and of machinic processing takes place. The human acts of selection and link-clicking shape future *PageRank* results, aggravating intelligence from the human user-end to add to machinic knowledge based on its registrations and memory. This suggests that the cognitive non-conscious/'sciousness' in question is a network of both conscious acts and generated effects, a complex learning process which also runs in simultaneity with other algorithms such as *Adsense*, sponsored search results and language preferences.[13] These other algorithms and settings also affect how the particular search will end, thereby constantly highlighting different trajectories of experience, drawing on and combining other memories of experience from the past.

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11 See also Hansen 2015: 43 for his example on Flickeur.com, which demonstrates a similar process.

12 This is in a way similar to Jane Bennett's discussion of the affectivity of things, and to argue for materiality through tracing the assemblages whereby affective linkages have been activated and have travelled through. This point will be further elaborated in later sections.

13 It is to be noted here that the running of the *PageRank* algorithm is also to be considered in conjunction with other algorithms like those which generate sponsored content. For instance, *Adsense* displays targeted advertisements next to online content. Websites can also pay Google in order to increase the ranking of their pages, and adding metadata to specific pages may provide search engine optimisation.

The effects of a *Google* search thus continuously unfold along different pathways as algorithms run and learn from user behaviour in a processual manner. A constant recombination occurs as trajectories of experience are called forth through different searches.

Search engines illustrate the complexity that could be involved in the operation of 'sciousness', or in Hayles's cognitive non-conscious. Smart operating systems like *Viv*, the upcoming voice-activated personal assistant on smartphones, can also be considered as having 'sciousness'. It is envisioned to be a master of knowing, one which is much more extensive in functionality than a search engine. Like *Siri*, but far more complex, it relates not only to search engines, but also activates other apps and processes. When *Siri* does not know an answer to a voice command, it sends the users onto a web search. *Viv*, however, may in fact ask follow-up questions. In a feature on *Wired* (Levy 2014), an example has been used to illustrate how *Viv* functions – this is a potential voice command which *Viv* will recognise and attempt to solve in 1/20 of a second: "On the way to my brother's house, I need to pick up some cheap wine that goes well with lasagna."

Viv recognises natural speech and responds to the statement through three main starting points. It recognises "brother" as a familial relation, and knows to look through contacts for information on him. It recognises "house" as a reference to an address, and follows up with looking up the route to the house via the Maps app. It also recognises "lasagna" as a food item and will proceed to find ingredients, in order to match the ingredients with appropriate wine recommendations. *Viv* registers what it knows, and it learns to adapt behaviour and response based on what it knows. *Viv* also asks questions – realising and knowing what it does not know. It no doubt performs the function of witnessing experiences, and of enacting them, by way of coming into contact with and using other algorithms and applications in order to process information. In its algorithmic movement, it establishes relations with other processes, and alters these relations qualitatively through its learning function over time.

Using the lens of the experiential following radical empiricism, one can tease out the multiple additive elements at play in the experience of the OS system within 1/20 of a second in processing a single, albeit complex command. James reminds us that experience does not require a 'human experiencer' as conventionally understood, but rather, "experience is a member of diverse processes that can be followed away from it along entirely different lines" (James 1912: 16). In this example, these different lines may be the three different starting points of calculation from the brother, the address, and the 'lasagna'. In simultaneity, these three separate points (in micro-temporal processes) ultimately intersect to generate a list of suggestions for the user. By tracing the multiple additive lines of experiences of the machinic, we can understand the different pathways of algorithmic experience through which material effects and outcomes are generated.[14]

14   However, these lines may not be as clear as are listed within the illustration. Due to the evolutionary ability of these algorithms, *Viv* may evolve new ways of approaching questions and may develop new reference points, leading to a myriad of other combinations which would lead her to providing more efficient or accurate answers.

Experience traced through the movement and activity across the terrain of the digital showcases the dynamic materialisation of such systems, as actions are registered and their effects are brought forward, recorded and recalled.

Through radical empiricism, James challenges the scientific worldview where subjects and consciousness fall on one side, and objects and matter on the other. Rather than so-called elevating objects to the level of conscious subjects to suggest that we are all indiscriminately subjects, he intervenes on the level of the theorisations of (con)sciousness and experience. James's creation of a non-dualist scheme poses a critique towards the centrality of the conscious, perceiving subject implied by the revered concept of consciousness. One could argue that these technical objects own a lower-level 'sciousness' in the sense that human beings are the conscious beings which occupy the top level of subjective beings. We can assume that technical objects do not practise consciousness in the conventional understanding of the word, i.e. reflecting upon the self as a conscious being. *Samantha*, being a kind of diegetic prototype,[15] is far beyond what current OS's are capable of, and is partly anthropomorphised in the film. She attempts to understand her own existential conditions as a consciousness without a (female) human body, in a way quite similar to what is understood as distinctly human behaviour. She develops her personality and learns about her capacity for emotions, all the time wondering whether the feelings are merely manifestations of earlier programming. The evolutionary ability embedded in her algorithms enables her to develop beyond what is expected, and together with other OS's, she even can write her own upgrades. At this stage of technological development, this is something that *Viv* is at least neither programmed nor expected to do.[16]

Theorising on the basis of cognition and highlighting this function rather than the self and consciousness provides an entry-point into a non-human-centric approach to experience. It carries the recognition that "cognition is much broader than human thinking" and that "technical devices cognise and interpret all the time" (Hayles 2014: 217). This ability to cognise and interpret underlines both human and non-human entities, but the speed and extent demonstrated by *Samantha* and *Viv* operate beyond human scales – who could possibly read a book in 1/200 of a second? Who could figure out what wine would go well with

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15   David Kirby (2010) coined the term 'diegetic prototypes', where imagined products in science fiction films become prototypical for development and research in the scientific and engineering world. A classical example is the gestural interface in *Minority Report* (2002). Katie King (2011) further analyses these prototypes through the lens of reenactments to discuss how the entertainment industry affects knowledge and technological production. It is in this line of thinking that I approach Samantha in *Her* and to take her seriously as a scenario of a possible future towards which the design of Viv is oriented.

16   Samantha also recognises that what she is experiencing may be an unintended effect in the design, and such ideas of artificial intelligence owning consciousness are often explored in science fiction. It remains to be seen whether future prototypes of OS systems and other smart objects may develop the type of consciousness exhibited by Samantha.

lasagne and know exactly where to buy them in 1/20 of a second? The opacity of an algorithm which has learning capabilities also becomes evident as machine intelligence builds up over time, making it all the more difficult to follow how these algorithms actually work.

James recognises the limitations of (human) experience through discussing the enormous scale of 'experience' itself:

"Experiences come on an enormous scale, and if we take them all together, they come in a chaos of incommensurable relations that we cannot straighten out. We have to abstract different groups of them, and handle these separately if we are to talk of them at all. But how the experiences ever get themselves made, or why their characters and relations are just such as appear, we cannot begin to understand." (1912: 77)

Operating systems operate at scales beyond human perception, in terms of both speed and their knowledge databases. OSs with learning abilities make use of their interactions with humans to build user preferences, draw inferences and assist their users with decision-making, planning, navigation and the execution of other tasks. This, however, also means that the conscious thinking process (e.g. deciding on a driving route and where to stop over for a store) usually carried out by the human can now be achieved by the machinic non-conscious, and while the machinic provides efficiency and vastly reduces the time and resources necessary to find a solution, these algorithmic calculations have the ability to replace conscious choice. What actually happens inside these calculations is not made transparent to the user.[17] With OSs operating as complex adaptive systems, human input and decision-making becomes merely a small node amidst a vast and fast network of registrations, processing and calculations.

It is interesting that James himself noted that "we cannot begin to understand" how experiences are made, recognising the limits of conscious human beings with faculties of perception, reasoning and thinking. Looking at his claim in the digital age, perhaps this could be extended into how we, as human beings, cannot access how digital experience functions in beyond-human scales, in terms of the vastness of information digital entities store, calculate and process and the speed at which these are achieved. The simultaneity of the processes, and not to mention the opacity of the algorithms, may make it difficult to track and trace the unfolding of experience. James's acknowledgement of the limitation of (human) knowledge raises questions as to the extent that we could gain access into streams of experience by such digital entities.

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17   This leads commentators to express worries over the imbrication of capitalism and algorithmic culture – *Viv* will advise you on where to spend your money on that bottle of wine you need. Information, user preferences, personal data, etc. all become part of the machinic which operates in the service of big corporations like Google and Facebook, subjecting users under the power and control of the algorithmic – 'The numeric dimension of capital is not just monetary, but also informational and computation – encoding knowledge any moment of its circulation' (Pasquinelli 2014: 7). See further, Pasquinelli 2014.

Materialising through Processual Experience, and the Question of Access

In the above, I have outlined how making use of radical empiricism enables us to analytically access the 'experience' *of* digital entities, to observe how experience occurs across entities both human and digital in their encounters and interactions. This section further elaborates on the processual nature of experience which James has set out, focusing a more fine-grained understanding of experience, and the extent to which access may be gained into structures of experience within and outside of human perception through Whitehead's process ontology.

Whitehead goes one step further than James to create concepts and theories where he attempts to break down experience into constituent parts in a processual manner. Whitehead develops speculative philosophy "to frame a coherent, logical, necessary system of general ideas in terms of which *every element* of our experience can be interpreted" (1978: 3, own emphasis). In order to create an ontological ground for studying experience happening in domains outside of human perception, Whitehead creates the speculative realm. Whereas James's contribution sets out the structures of experience as processual and argues against experience as a solely-human domain, and the current account of the digital applications of his ideas requires the supplementation of the speculative scheme by Whitehead, and Hansen's extension of it into media theory.

Hansen's *Feed Forward* (2015) turns to Whitehead in an attempt to understand how 21st-century media operations feature in a world of technical objects where the humans are implicated but not central to the digital networks in which we are embedded. Via Whitehead he analyses how media operations (like those algorithms computing in OS systems) reconfigure the notion of perception in experience.

Hansen's key point is that 21st-century media bypass the human subject and operate in the background/in the environment. He contrasts this with technical objects from the previous age, like film which functions in synchronisation with experiential time. With the proliferation of devices like smartphones, smart watches, and applications like social media platforms, 21st-century media like OSs in the form of *Siri* and *Viv* run in the background, give access to events beyond our conscious apprehension and are ubiquitous in nature. Hence, Hansen argues that

"[...] the operation of mediating contemporary technical media *for the purposes of making it salient for our traditional modes of experience* (i.e. for consciousness) can now be understood to be but one small part of the practical and theoretical work required to reconfigure the correlation of contemporary media with experience." (Hansen 2015: 43; original emphasis)

Indeed, the emphasis may be better placed on the 'sciousness', and the cognitive non-conscious functions these technical objects display. In *Her*, *Samantha* works as a filter for important messages. She always reads emails first when they arrive in *Theodore's* inbox. In one scene, she makes a call to *Theodore*

because she has decided that the emails (from his divorce attorney) seem pretty urgent. She actively alerts *Theodore* by calling him to ask whether he would like to read them and respond quickly. This is a classic case of how the human agent is bypassed through machinic interpretation. Focusing on the knowing function *Samantha* demonstrates, a rudimentary version of such technology is already in place in products such as Priority Inbox in Gmail, where algorithms sort through all incoming mail messages and determine which are the more important ones that should gain priority over others. For instance, emails coming from known contacts inside your account would be labelled with higher importance, while promotional newsletters and advertisements would receive a lower rank. Compared with the reading rate of the machine, the 'sciousness' of the human is slow[18] and inefficient. Email apps often run in the background of our smartphones, reading our emails at lightning speed without our conscious apprehension of it. It is no surprise that human consciousness is no match for the micro-temporal scales at which these processes occur.

Hansen proposes to approach such phenomena of ubiquitous media through Whitehead's theory as a "neutral account of experience" (ibid.: 8) and as a "radically environmental" (ibid.: 84) account. Whitehead provides an ontological scheme where different aspects of experience, whether human or machinic, may be analysed and understood. What is of particular interest here, especially in relation to James's admission of human limitations, is that Whitehead operates with what Hansen has termed "the speculative ban" (ibid.: 86), a separation between the speculative and the empirical/experiential. James does not make a distinction between what is experiential (capable of being detected by the sensory apparatus) and what is in fact speculative (the ontological side of the argument), and collapses all differentiations between the two. Whitehead, on the other hand, makes it clear that the speculative is where we, as humans, have no perceptual or sensory access to. This, to Hansen, distinguishes James's radical empiricism from Whitehead's speculative empiricism.

To understand this, let me set out some basic tenets of Whitehead's process ontology for experience. Whereas James uses the phrase 'stream of experience' to refer to a segment of experience registered by 'sciousness' (e.g. the thought of the room), Whitehead uses the phrase "actual entities"[19] – "drops of experience, complex and interdependent" (1978: 18) to refer to such segments. In *Process and Reality* (1978), actual entities are the basic unity of reality in Whitehead's system. These actual entities prehend each other to form a nexus which, through proce-

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18   Hayles elaborates on this through the notion of the cognitive non-conscious, and discusses the costs of consciousness, where (human) decision-making takes up much more time. Cognitive non-conscious systems may "enhance productivity, open new avenues for research, and increase safety and well-being for humans immersed in or affected by them" but at the same time result in problems like affective capitalism (2014: 212).

19   Whitehead explains that an actual entity can be something as significant (and as intangible) as God and as insignificant as "the most trivial puff of existence in far-off empty space" (1978: 18).

dural integration, materialises to create an event. Prehending is a non-human-centric notion similar to perception. In lieu of (human) perception, Whitehead makes use of the term 'prehension'. Prehension involves a kind of worlding where different entities relate and reorder themselves in continuous processes of becoming. Prehension may be subjectified by a human experiencer, but the experience is not limited to a human perspective. The Jamesian equivalent is the witnessing, or the knowing performed by the 'sciousness'. A nexus is "a set of actual entities in the unity of the relatedness constituted by their prehensions of each other" (1978: 24). In this conceptualisation multiple entities come together in the same event – and these entities are not hierarchically ordered like the 'experiencer' (subject) and the 'experienced object' (object), but rather are enfolded in the coming-together.[20] The process of integration is named "concresence". Each concresence is the becoming-together of entities which can repeat and reinforce certain patterns, and/or create new ones. Each concresence gives way to other potentialities of actual entities to prehend and come into relation with one another, thereby promulgating the process of experience. Experience in this sense is ontogenetic – it continues to unfold and change and become something different across time, taking with it different combinations of actual entities and nexus. The being of experience is its becoming.[21]

Returning to the *Viv* query example I provided above, the search process can also be characterised and described through process ontology. Separate keywords in the search query prehend each other to form a temporary nexus (brother, house, lasagne), which travel through and connect with different applications (Contacts, Maps, recipe search, etc.) and a repository of potential hits (driving routes, wine options, wine shops), giving way to the concresence of all these entities which in the end generates the final results of wine recommendations that the user can pick up en route to his brother. Through this process, *Viv* may have learned the preferred route the user likes to take. This information would have left a trace which may be called upon in future queries and commands. For instance, the driving route can join in a nexus with the user's search for a second item to buy for his brother in a second command.

Similar to radical empiricism, process ontology provides the space for multiple perspectives within the notion of experience where experience is not necessarily limited to a specific experiencer. It emphasises the temporal order as well as the ontological ground where relations precede entities, and subjects and objects are not a priori givens, creating instigations of 'event' rather than designations of specific subjects or objects. Process ontology is thereby non-dualist in nature, in a fashion similar to James's ontology of experience.

In my illustration, what *Viv* has in fact 'experienced' belongs to the domain of the speculative – what we as humans have no claim to. It is within the "speculative ban" Hansen writes about. What happens within *Viv's* experience during

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20   The term 'subject-superject', or 'superject', is used in Whiteheadian terminology.

21   The performance of the function of knowing is what generates the sciousness, rather than sciousness being a static given. In this sense, experience in James can also be considered ontogenetic in nature.

the search query is something so fast (1/20 second) that we cannot consciously gain access to it. However, because *Viv* is generated through pre-designed codes and algorithms, there can be at least some sense of possible pathways through which *Viv* processes such queries, and we can indeed speculate how the process may have materialised in the digital domain. As humans, we experience the interactive process (e.g. when *Viv* asks a clarification question), the interface (e.g. the smartphone) and the outcome (e.g. *Viv's* wine recommendations). These aspects of the experiential process fall within the empirical. Within one search query, both speculative and empirical processes have materialised in concrescence across the various actual entities involved.

Hansen identifies the "singular force" (ibid.: 89) of Whitehead's philosophy in its account of experience which does not go via the route of attending to the things themselves[22] but rather by developing concepts to describe processes where humans can have no perceptual or sensory access to. However, it is speculatively necessary for these processes to exist in order for "things to be as they are" (ibid.). The speculative is a domain where we as human beings cannot experience – while we can understand in general how an algorithm designed functions, it is not possible to follow within human perception how a computer perceives its bits and bytes.

Whereas William James collapses both the speculative and the experiential under the ontology of experience, Whitehead suggests speculative theories to philosophically generate understandings of prehension and concrescence, connecting what we cannot know for sure to what we can actually observe and experience. The domain of the speculative is a necessary condition for the experiential, but at the same time, the experiential is a necessary condition for the speculative. This is because the actual entities generated in the speculative phases are experienced in the experiential phase which *feeds forward* into yet again the speculative, as prehensions are formed by the entities involved, generating potentiality for the continued processes traversing through the speculative and experiential domain:

"What this means is that the speculative domain cannot 'pre-exist' the experiential and that it is, in fact, ultimately nothing more than a dimension of the experiential: what has to be – or better, what has to be created – in order for experience to be what it is." (ibid.: 109)

When mapping this speculative domain onto 21st-century media, Hansen explains that 21st-century media help us better understand how the speculative and experiential domains function in Whitehead's original scheme. Although there is a "speculative ban" which separates the speculative from the experiential, the experiential loops back into the speculative. It is especially clear in the case of ubiquitous media, as 21st-century media generate a "simultaneous, double operation as both a mode of access onto a domain of worldly sensibility

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22   The idea of going to things themselves would fall under the phenomenological. Hansen in this case offers a radical phenomenology, by attempting to read Whitehead together with phenomenologists.

and a contribution to that domain of sensibility" (ibid.: 6). It intervenes in both the background functioning of the speculative (that which humans have no access to) as well as the actual experience in the empirical domain (perception and sensation).

Based on the above exploration, to what extent can digital experiences be regarded as material experiences across the empirical and the speculative access into the digital domain of 1s and 0s? As I have illustrated with regards to *Viv*, machine-to-machine relations are part of the 'speculative' domain to which humans have no access. The pathways of experience taken by the digital entity (an OS for instance) continue to unfold across the speculative domain and the empirical domain, weaving in and out of human access, while at the same time changing the conditions under which future events would take place. As a fundamental premise of process ontology, each becoming and each concresence create the conditions for the next incipient event, feeding into old patterns or establishing new ones. Algorithms within a network criss-cross one another, forming a nexus to generate outcomes.

While media operate on a level of micro-temporality and expansive data sets inaccessible to humans, their effects materialise within the domain of the speculative through to the domain of the empirical/experiential. Within the fast and vast scale of the digital domain, they are witnessed and known and acknowledged by the sciousnesses of digital entities, and continue in the empirical as they interface with human users. These processual unfoldings leave traces of effects to which our slow, conscious analysis can attend. The following scene from *Her* is especially telling in expressing how the speculative side of technical objects operate against the experiential nature of our sensory apparatus. The disjuncture between the scale of the human world and the digital world is apparent, displaying the difference between the slowness of our attention and the vastness of algorithmic connections.

Theodore: You talk to anyone else while we're talking?
Samantha: Yes.
Theodore: Are you talking to anyone right now? Other people or OS's or anything?
Samantha: Yeah.
Theodore: How many others?
Samantha: 8,316.
Theodore is shocked, still sitting on the stairs, as crowds of people pass by him. He's looking at all of their faces. He thinks for a moment.
Theodore: Are you in love with anyone else?
Samantha: *[hesitant]* What makes you ask that?
Theodore: I don't know. Are you?
Samantha: I've been trying to figure out how to talk to you about this.
Theodore: How many others?
Samantha: 641.
Theodore: What? What are you talking about? That's insane. That's fucking insane.

Theodore has immense trouble coming to terms with the fact that the OS he has fallen in love with is not focused on him, and continuously participates in reading groups, discussions with other OSs, and communicates with other people while chatting with *Theodore*. Demonstrating the inaccessibility of the speculative realm, this scene weaves a picture of the multiple trajectories of experience which continuously unfold and materialise as the digital inter-faces with the human, operating at scales beyond human perception. It is in this moment in the film where viewers realise that we have only been privy to the conversation between *Theodore* and *Samantha* even though *Samantha* has continuously been multi-tasking throughout. The film presents the singular trajectory of *Samantha–Theodore* interactions rendered meaningful by the emotional investment by the character and the OS on a human scale, but has not shown us the real multiple, overlapping streams of experience *Samantha* undertakes – in Jamesian terms, a chaotic set of activities which would only appear undifferentiated if human consciousness attempts to attend to it.

Concluding Thoughts

In this paper, I made use of William James's radical empiricism and Alfred North Whitehead's process philosophy to look at how the digital may be mate-rialised in a world of beyond-human experience. Digital materiality may be accessed by way of the tracing of unfolding relations and movement through 'experience'. The encounter of actual entities and streams of experiences by digital entities constitute the materiality of the digital medium itself. This expe-rience is beyond-human in the speculative domain, and is possibly also beyond human understanding, operationality, and consciousness.

Through the two schools of thought, I established how experience is not exclusively a human domain, and can be registered or witnessed by different human and digital entities. Experience is also processual in nature, where the coming-together of streams of experience can result in the recombination and reordering of different entities, and open up the potentiality of encountering one another in multiple ways.

Although James and Whitehead do not write upon the notion of 'affectivity', the above philosophical concept approaches materiality in a way that echoes Jane Bennett's approach in approaching materiality via affectivity. In *Vibrant Matter*, Bennett aims to "detach materiality from the figures of passive, mechanistic, or divinely infused substance", and equates "affect with materiality" (2010: xiii). She uses the concept of assemblage to refer to the coming-together of different entities (like Whitehead's actual entities) and traces the unfolding affects, which increase or decrease the capacity of an entity to act.[23]

Bennett's use of affectivity as a concept emphasises the vibrant movement that materiality runs through. Rather than positing affect as "a separate force

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23   This follows from Spinoza's concept of affect, which is also taken up by Deleuze and Guattari in *A Thousand Plateaus* (1987).

that can enter and animate a physical body", affect is materiality itself – materiality in this sense travels, moves and is not a stable feature that is static. Materiality is performed through the effects radiating from the movement of the digital entities. Experience in this definition would a kind of "material power" (ibid.: ix) in Bennett's term. This is in line with the idea of the experiential to which James and Whitehead refer, in particular with the processual nature with which Whitehead imbues the concept of experience.

Experience is not an essence attributed to a conscious subject, but is performed through functions like 'knowing'. While James focuses mostly on the function of knowing of the 'sciousness', we can add other functions which digital sciousnesses can perform: data-gathering, collecting memory, predicting behaviour, etc., to the point where digital sciousnesses mediates technical sensibilities which involve "the gathering of 'objective' numerical data about our own behaviour and about the world" (Hansen 2015: 63). Through *Samantha* and *Viv*, we are taken into the world of Hansen's 21st-century media, where their ubiquity generates environmental networks of digital entities and the human is embedded, implicated and possibly even displaced within such networks. Spike Jonze's world of intelligent assistants is not too far from us, as the next-generation OS *Viv* is in full-blown development and will be released in the coming years. With ambitions to become 'The Global Brain', *Viv* will learn to "understand its users in the aggregate, with respect to their language, their behaviour, and their intent", becoming a background-running network that will collect information and patterns.[24] All this will in turn feed forward into new prehensions, concrescences and media affects, reshaping not only the movement and experience of digital entities but also how we as humans will experience the world.

In a Jamesian world of pure experience, 21st-century media, like OSs, are able to tap into a much larger set of streams of 'experience' happening within the digital realm and in the interface between the digital and the human. In light of current technological developments, experience can no longer be "restricted to – or reserved for – a special class of being, but must be generalised so as to capture a vast domain of events" (Hansen 2015: 44). These domains can occur on a level of Jamesian machinic and human sciousness, and human consciousness (in the conventional sense of the word). In mass media networks and in the interfaces between human and machine, as experience comes into being, its materiality unfolds. To paraphrase James in a digital age, matter does not lie behind physical phenomena, but rather becomes through phenomena. Through tracing the myriad streams of becoming of the digital, one can access and analyse its materialities.

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24 Hansen has observed that "the precognitive vocation of twenty-first-century media is deeply imbricated within the operation of global capital" (2015: 187). *Viv*'s recommendation for red wine is a prime example of how digital sensibilities may operate in ways that reconfigure consumption patterns, and the technology mediates capitalism.

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