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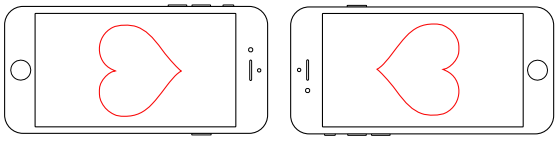

FCJ–182 Middlebroware

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Abstract:

Software for creating, editing and organising media content occupies a significant place in the contemporary production of culture. Through a combination of scholarship from traditions in science and technology studies, media studies, and the sociology of art, I develop a framework for understanding the symbolic ordering of such software based on the entanglements between objects and subjects through commoditisation. In the first half of the paper, I construct a conceptual framework around 'middlebroware' as a means of conceptualising and analysing the processes of symbolic ordering that take place through the design and use of certain kinds of commoditised media software. The latter half of the paper will apply this framework to a case study of Photoshop as an example of middlebroware.

Introduction

In the introductory chapter to *Software Takes Command*, Lev Manovich (2012: 31) justifies his decision to focus his study on software applications instead of 'the activity of programming' by arguing that the former – for the most part commercial application software like

Photoshop, AfterEffects, and Final Cut Pro – represent the tools of 'mainstream cultural practices' of digital media production while the latter represents an exceptional practice. Manovich's self-justification serves as a useful starting point for this paper because it draws attention to two sets of interrelated questions regarding contemporary digitally mediated cultural production.

The first set of questions stems from Manovich's acknowledgement that digital media producers, including people who program, represent a significant group of cultural producers (Dovey and Kennedy, 2007; Mackenzie, 2006: 32–33). But recognising programmers as cultural producers raises a classificatory challenge: is the practice of programming necessarily a distinct form of cultural production in relation to other forms of digital culture? Is this distinction based on a privileged access to certain properties of digital media? Some have taken the ranking of programming above other forms of digitally mediated practices as far as proclaiming that one should 'program or be programmed' (Rushkoff, 2011). However, it is impossible to make distinctions between using application software and programming for the production of culture without clarifying the complex and contingent symbolic categories that make such distinctions possible; categories like 'mainstream'. It is certainly possible to identify examples of programming that could qualify as 'mainstream practices' if by mainstream we mean practices that are driven by large-scale commercial markets. For example, manufacturers of mobile devices have turned to 'app markets' in order to provide users with access to new applications. Part of this business model entails scaling up the number of developers who produce apps for these users through 'crowdsourcing' (Bergvall-Kåreborn and Howcroft, 2013). Based on such an example, 'mainstream' and exceptional do not seem to be sufficient categories for distinguishing between programming and other digitally mediated practices.

The second set of questions stemming from Manovich's justification relates to a topic that he has done much to draw attention to in his work: how should we classify the work of practitioners who use application software? In light of the first set of questions, to what extent are the people who use application software enabled and constrained by their use of this mainstream 'media software' – 'software for creating, editing and organizing media content' (Manovich 2013: 24)? If, as Manovich argues in his book, the rise of social media represents a new and improved class of media software, what future is in store for practitioners who remain wedded to 'old' media software like Photoshop or Final Cut Pro?

In this paper, I set out to address the modes of ordering subjects, objects and practices of digital media production by building on Manovich's original definition of media software in a way that explicitly addresses symbolic relations of power for the production of culture. Combining scholarship from traditions in science and technology studies, media studies,

and the sociology of art, I set out to investigate the distinct modes of ordering* *(Couldry, 2012: 66) cultural work with media software. This approach entails lending a greater amount of attention to the socio-material assemblages that constitute the subjects and objects of digitally mediated culture. In the first half of the paper, I construct a conceptual framework around 'middlebroware' – defined as the configuration of commoditised media software and its related practices of design and use – to conceptualise and analyse the processes of symbolic ordering that take place with media software. The latter half of the paper will apply this framework to a case study of Photoshop as an example of middlebroware.

Configuring users and designers for the production of culture

Computer engineers and software developers draw from definitions of what constitutes a user to design hardware and software. These definitions change considerably over time and are contingent upon broader social and technological relationships that mediate design and use (Grudin, 1990). Scholars like Steve Woolgar (1991) use 'configuration' to analyse the processes involved in designing 'the user' into semiotic and material assemblages of computational infrastructure. For Woolgar, studying how the user is configured entails studying how different groups of designers – from engineers to marketers to user-experience designers – mobilise different, and at times competing, definitions of the user as part of the process of designing information and communication technologies. Configuration has since been critically refined by a number of scholars who challenge Woolgar's initial focus on designers, arguing that one should also recognise the contributions of end-users in the different stages of configuring users of information and communication technologies.

One example of this refinement is Silverstone and Haddon's (1996) study charting the 'domestication of information and communication technologies' (ICTs). By following the career of an information and communication technology from its early inception to its subsequent consumption, appropriation and conversion by families, they argue that social groups like the family within the context of everyday domestic life represent key contributors to the articulation of meaningful uses of ICTs. A second example of this refinement is Leah Lievrouw's 'reconfiguration': a mode of communicative action 'where users modify and adapt media technologies and systems as needed to suit their various purposes or interests' (Lievrouw, 2011: 4) by reinventing or hacking these same technologies or systems. Reconfiguration draws attention to the contingency of ICT designs once they are in the hands of groups of users who have the technological skills required to alter said technologies. Finally, a third example of how configuration has been

adapted is a focus on how end-users are included or excluded from the processes that configure the user for ICTs (Hope and Amdhal, 2011).

The above examples extend configuration into an open-ended and contested process whose stakes have always encompassed more than the 'merely' technological to include how technologies are always already embedded in the social and the cultural. With this in mind, the following definition of configuration by Lucy Suchman seems particularly adequate for the purpose of this paper:

> *[...] a device for studying technologies with a particular attention to the imaginaries and materialities that they join together [author's emphasis], an orientation that resonates as well with the term's common usage to refer to the conjoining of diverse elements in practices of systems design and engineering. (Suchman, 2012: 48)*

As part of her discussion of configuration, Suchman reverse engineers the term to distinguish between 'figuration' as the physical, symbolic, and emotional work of disentangling subjects and/or objects from techno-social assemblages and the prefix 'con' to refer to the bringing together of such figurations. Her definition of configuration can be understood as a call to investigate the politics of differentiating and converging relationships between designers and users through techno-social assemblages (Voss et. al., 2009: 1).

Configuration scholarship problematises notions of subjectivity surrounding the design and use of technologies like media software. The practices of designing and using media software are predicated on pre-existing yet contested definitions of cultural subjects and objects for the production of culture. At stake in these definitions is the ability to define the orders of worth for culture. Returning to the above example of classificatory distinctions between the practice of programming and the practice of using application software, there is a politics of figurations and configurations at work in defining both categories of practice. The devices of figuration and configuration are used to explore the different divisions and unions that make-up cultural production: how one distinguishes the graphic designer and her application software from the app developer and her software development kit. But as Suchman makes clear, the project of studying configurations cannot be dissociated from their politics of cultural historical imaginaries (Suchman, 2012: 52). In the case of the production of culture with media software, this politics includes how media software remediates pre-existing classificatory distinctions between elite and popular, or mainstream and exceptional, and, finally, how people can use these distinctions at the expense of others. With this in mind, I put forward a conceptual framework that addresses

the historical specificities of the politics of cultural production with media software in the following section.

Defining middlebroware

Tackling the politics of configuration for the production of culture with media software requires a conceptual framework that draws attention to the distinct ways in which people redeploy modes of ordering subjects and objects through the design and use of media software and how such positions constitute a symbolic order for cultural production. I propose 'middlebroware', a portemanteau that combines 'middleware' and 'middlebrow', as one potential framework for such a study.

Middleware

The term 'middleware' is used among computer engineers to refer to software that operates between 'front-end' applications and 'back-end' computing resources. It is:

> *Software that mediates between an application program and a network. It manages the interaction between disparate applications across the heterogeneous computing platforms. (Howe, 1985)*

While it is unlikely that computer engineers and other computing experts would consider media software 'proper' middleware, the term is fitting in this case because it evokes an invisible or implicit mediation: just as middleware serves as a kind of 'software glue' (Wikipedia, 2014), software for cultural production can serve as a similar type of 'glue' for cultural work – enabling and constraining the production, circulation, and appreciation of cultural content.

It should also be pointed out that the suffix 'ware' as applied to this context reasserts an earlier meaning that precedes its first use in print as a means of distinguishing software as 'the carefully planned interpretive routines, compilers, and other aspects of automative programming' from the hardware 'of tubes, transistors, wires, tapes and the like' (Tukey,

1958: 2). I use 'ware' in this context to reaffirm the traditional use of the suffix to name various commoditised categories of goods or materials that share a particular property or function: stoneware, earthenware, tableware, etc. The first trait that characterises middlebroware is therefore software for creating, editing, and organising media content whose design and use are brought together through organising principles of commoditisation.

Middlebrow art

Pierre Bourdieu et al.'s (1990) study of photography in 1970s France may seem like a dated point of reference from which to draw concepts for an analysis of digital media. Their study chronicled how diverse groups of photographers from domestic spheres of production (like members of amateur photography clubs) to professional and semi-professional fields (like magazine or sports photographers) understood and positioned their works in relation to broader economic, political and cultural frameworks. They argued that photographers who aspired for recognition as part of a legitimate art form faced an enormous challenge due to photography's ties to so many non-artistic cultural fields; from journalism, to domestic life, to advertising, etc. 'Art-for-art's-sake' represented an ideal that imparted aesthetic legitimacy to practitioners. Photography, however, was treated as middlebrow art *('un art moyen')* by privileged social classes because it was located midway between 'noble' and 'vulgar' practices (Bourdieu et. al., 1990: 97), leaving photographers condemned 'to create a substitute for the sense of legitimacy which is given to the priests of all the legitimate arts' (Bourdieu 1993: 131).

More generally, all those marginal cultural producers whose position obliges them to conquer the cultural legitimacy unquestioningly accorded to the consecrated progressions expose themselves to redoubled suspicion by the efforts they can hardly avoid making to challenge its principles. (Bourdieu 1993: 131)

This conceptualisation of middlebrow culture was based on a distinction between different fields (*champs*) of practice whereby middlebrow cultural practices were subsumed to a commercial logic aimed at a public of consumers while, by contrast, autonomous fields of artistic production involved creators producing for other creators. This framework is relevant for studying the politics of cultural historical imaginaries of media software because it addresses how cultural practices are symbolically enabled and constrained by capitalist logics of commoditisation. It provides the means to analyse how symbolic orders generate and reinforce categorical distinctions to describe reality that in turn enables

and constrains people's ability to deal with said reality (Couldry 2012: 88). Practitioners of middlebrow arts are excluded from dominant institutions because of their indefinite position 'between' dominant categories of practice. In this sense, the 'middle' represents a margin from which practitioners struggle to define their existence as cultural subjects. As Bourdieu and his collaborators so astutely recognised, these midway practices do not benefit from clear and distinct subject or object categories and therefore represent fertile ground for examining how such categories are contested or justified and how such negotiations affect the people involved.

My goal in discussing middlebrow art is not to call for a 'Bourdieuian' sociology of software so much as to draw key insights from this tradition in order to examine how classes of objects, subjects and practices are entangled through software. Based on my critical reading of this conceptual framework in the context of contemporary digital culture, I would like to raise two points that require further reflection and development. The first involves applying 'art-for-art's sake' as a fixed ideal to which all creators, or their audiences, aspire. While such an ideal may have been dominant in French society at the time of Bourdieu and his collaborators' research, the definition of culture and creativity has shifted since the mid-twentieth century, undermining the orders of worth that designated art-for art's sake as the dominant point of reference for cultural status. The mid-twentieth century saw the emergence of alternative definitions of art subjects within academic institutions (Singerman, 1999) as well as artists calling for 'everyone' to be an artist (De Duve, 1997: 283–292). Contemporary media as an intersecting field of cultural production has also transformed how symbolic capital within traditional arts fields is generated and unevenly concentrated (Couldry, 2012: 153).

Popular discourses of 'creativity' that emphasise individual entrepreneurship and affective commitment to cultural production now occupy a significant symbolic position in the arts and beyond. For example, creativity as a normative value has been progressively assimilated by capitalist modes of production into everyday work (Boltanski and Chiapello, 2005). By the beginning of the twenty first century, 'everyone is creative' has been incorporated into government policy agendas (Garnham, 2005) and is embodied in the entrepreneurialism encouraged for new entrants in cultural fields (McRobbie, 2004).

The impact of this creative discourse has also found fertile ground in the mix of counter-culture activism and libertarian individualism that informs much of the culture of Silicon Valley and the development of media software (Barbrook and Cameron, 1996; Turner, 2006; Lievrouw, 2011: 98–118). Silicon Valley's remediation of culture and creativity came full circle through the work of people like Alan Kay and his collaborators at Xerox PARC whose vision for the graphical user interface involved designing computers to work as 'a

medium of expression through drawing, painting, animating pictures, and composing and generating music.' (Manovich, 2012: 64).

Based on this account, one cannot study media software under the given assumption that cultural practitioners work within a clear symbolic order that necessarily prioritises autonomous cultural fields over fields concerned with commercial success. Art-for-art's sake does not disappear with media software but nor does it maintain its status as the benchmark of cultural legitimacy within dominant symbolic orders of digital culture. The sheer diversity, complexity, and contingency of classificatory frameworks circulating across fields of practice represent a considerable challenge for developing media software.

The second point for further reflection that I wish to address involves the dual role of technology within the production of culture. Its first role is as part of the infrastructure of fields of cultural production. Jonathan Sterne's reading of Bourdieu's work suggests that he approached the study of technology as bundles of implicit 'organized social action' (Sterne, 2003: 370):

> *[...] technology is not simply a 'thing' that 'fills' a predetermined social purpose. Technologies are socially shaped along with their meanings, functions, and domains and use. Thus, they cannot come into existence simply to fill a pre-existing role, since the role itself is co-created with the technology by its makers and users. More importantly, this role is not a static function but something that can change over time for groups of people. (Sterne, 2003: 373)*

By implication, scholars of technology should avoid attributing the camera as the sole technology of photography or assuming that the camera has a universal function. But Sterne's take on Bourdieu also implies that one should avoid equating the entire field of photography with the practice of taking pictures. These cautions are relevant in the case of media software if one considers how digitisation has created the impression of a technological society across fields of cultural production (Deuze, 2007: 16–17). The formal properties of works and the tools for the production of culture constitute often-implicit infrastructures for the symbolic order of fields. But infrastructures are not always stable, resulting in significant implications for the symbolic and social order of fields. For example, historical analysis of photography in the mid-nineteenth century demonstrates how attempts to differentiate the photographer-subject from other types of social actors in the field (Battani, 1999) – what I refer to here are the figuration of the photographer within the socio-material assemblages that enable and constrain photographic practices – also depended on sorting through all of the technical processes of photography in

order to define what constituted the essential components of producing photographs from the technological processes that were 'merely' supporting producing photographs. As long as the practice of making content remained ill defined, it was difficult to articulate a clear and well-defined subject position for the author of such content (and vice versa). Distilling an author-subject from the infrastructural arrangements that support cultural work is a longstanding figuration for establishing order within the production of culture and distinguishing creators from their support personnel. Similar figuration challenges can be found in other contemporary amateur media production such as video (Buckingham, 2009).

The 'technological' has been historically deployed as part of cultural imaginaries. As Bourdieu's work has shown, the technological is deployed within fields of cultural practice to produce categorical differentiations between, for example, what is and what isn't 'Art'. Technological knowledge has historically been associated to functional knowledge and to being a working class concern. The contingent links between infrastructure, figurations of authorship, and categorisations of technological knowledge are all the more significant in light of the status of creativity as cultural value discussed above. Even an occupational description of 'graphic arts technician' by the government of Canada, for example, emphasises the importance of 'creativity and talent' over 'technical requirements (software knowledge)' (Government of Canada, 2013). Hierarchical distinctions between technicians and creative talent in fields of cultural production are hardly anything new (Hesmondhalgh, 2007: 64). However one must consider the specific ways in which application software has been configured to the technological without assuming that classificatory distinctions and conversions only take place on a binary difference between 'technological' and 'not technological'. Instead, one must look to the specific combinations of practices, subjects, and objects that encapsulate commitments to technological knowledge and how such commitments can enable or constrain cultural work.

Middlebroware therefore provides a way to examine what is at stake in the competing configurations of cultural subjects in digital media production with a specific focus on how commoditisation works as an organising principle for media software without presuming that such an organisation is static. It recognises that the multiple fields of practice involved in the production, circulation and appreciation of digital cultural artefacts depend on media software that is subjected to multiple orders of worth but that commoditisation creates entanglements within these orders of worth that position subjects and objects to a contingent 'middle' positionality. Social actors may attempt to reposition themselves from this middle ground in order to try to produce the 'right kind' of figurations from the entanglements of middlebroware.

Middlebroware is a device for studying how certain types of media software enable and

constrain the symbolic ordering of cultural subjects and objects for the production of culture. The principle contribution of middlebroware to an analysis of media software is therefore to turn our attention to the complex ways in which media software enables and constrains how social actors define cultural categories and deploy such categories to produce symbolic order as part of cultural production. Conceptualised through the trope of configuration, the middlebrow practitioner is conjoined to elements that mediate her ability to draw out a figuration of her choosing. The glue analogy I used earlier for middleware can be extended just as well to middlebroware in that the category of middlebrow draws together disparate elements to produce coherent practices while also latching these practices to subjects and objects that constrain the acquisition of cultural status.

Studying middlebroware

I will now apply the above conceptual framework to a case study. The methodological approach used to produce this case study is based on the cultural biography (Kopytoff, 1986; Silverstone and Haddon, 1996; Lash and Lury, 2007) of a digital object. This approach entails collecting biographical material related to the design of the object as well as biographical accounts of those who use the object (Lesage, 2013). By following middlebroware, I turn my attention to the ways in which subjects and objects are joined through practice with a focus on the ways in which the commoditization of media software enables and constrains techno-social relationships for the production of culture. Studying middlebroware answers Geoffrey Bowker and Susan Leigh Star's (2000) call to study the 'taken-for-granted' objects through an infrastructural inversion, investigating the overlooked 'middle' of creating, distributing and appreciating digital culture.

Adobe Photoshop was selected as an example of middlebroware because of its extensive career and because of, as Manovich (2011) puts it, its status as the application that is most closely associated to the category of 'digital media'. The case study is divided into subsections addressing its design (4.1) and use (4.2) for digital imaging but it should also be noted that its mediation is not limited to this specific practice (Lesage, (2014–2015); Lesage and Smirnova, 2015).

Designing Photoshop

Following its successful role in creating a mass-market for printing and publishing technologies in the 1980s, Adobe Systems turned its attention to developing 'shrink wrapped' application software 'for the creative professionals who drive the publishing process' (Pfiffner, 2003: 101). One of Adobe's earliest successes in this market was Photoshop, an application it acquired from John and Thomas Knoll in the late 1980s. Photoshop became an instant bestseller and has since become the standard application for digital imaging. In 2015, the official Adobe version celebrates its twenty-fifth anniversary as one of the best-known personal computer applications. Its canonical position was enshrined by the dictionary definition of the verb 'photoshop' which became nearly synonymous with 'digital imaging':

> *To edit, manipulate, or alter (a photographic image) digitally using Photoshop image-editing software. (O.E.D., 2006)*

Three of Photoshop's early design characteristics made it a fitting example of middlebroware. The first of these characteristics was how Adobe and its designers defined the market for the application in its early days. Adobe's "1990 Photoshop Invitational", for example, was an exclusive event aimed at potential early adopters. Adobe invited a select group of practitioners to collaborate and discuss with some the application's designers. Participants included representatives of the more elite fields of cultural production such as fine-art book publisher Nicholas Callaway and the British painter David Hockney (Pfiffner, 2003: 102). But along with these lofty aspirations were also ambitions to design an application that would capture as wide a range of cultural practices and practitioners as possible (Poole, 1991: 152; Lesage, 2014–15).

This seemingly incongruous approach, catering to elite creators while also courting general consumers, remained a constant through much of Photoshop's existence. Adobe would subsequently develop simpler and cheaper consumer spinoffs from the main Photoshop product with apps such as Photoshop Elements.

The second design characteristic was Photoshop's capacity to import and export in multiple digital image formats: 'Then and now, much of the code is related to input/output and the myriad of file formats that Photoshop has to attend to' (Grady Booch quoted in Shustek (2013)). Despite a plethora of options, including .psd, .tiff, .jpg, .bmp., etc., (Brown and Sheppard, 1995: 9–37) there never was one dominant digital imaging format. One

of Photoshop's particular strengths was its ability to deal with a considerable number of digital image formats beyond its own '.psd', allowing Photoshop to accommodate a wide range of different types of images coming from a broad range of sources, making it one of the standard applications for production workflows in digital media (Manovich, 2008: 123).

The third design characteristic was the extensive, and continually growing, number of features and filters built into the application over the course of its existence. Many of these features were not unique to Photoshop (Manovich, 2011). In fact, the progressive 'feature creep' in Photoshop's growth from just over 100 000 lines of code to more than 10 000 000 lines of code in later versions (Shustek, 2013) was a common occurrence in the perpetual upgrade economy (Kline, Dyer-Witheford, and de Peuter, 2003) of commercial application software. In his study of the ubiquitous commercial writing productivity application *Microsoft Word*, Matthew Fuller (2001) argued that these 'feature mountains' were made possible in part by the object oriented programming languages used to design these applications and in part because of the commercial imperatives that drove their development. Citing Michel Foucault's work on the government of the self by the self (the quote cited was itself taken, appropriately enough, from Richard Sennett's work on the corrosion of character in contemporary work), Fuller observed how *Word's* feature mountain configured a particular type of autonomous user, one who was asked to encompass and internalise knowledge of the application.

Photoshop's particular modular design was based on 'plugins'. Some of the Adobe staff found that the special effects features in the original design – particularly its filters – were too 'gimmicky' and inappropriate for a 'serious application' (Schewe, 2000: 18). This difference of opinion may have been due to Adobe's pedigree in publishing in contrast to Thomas Knoll's background as a computer engineering student and John Knoll's background in film special effects at Industrial Light and Magic in California. John is said to have introduced plugins as a way of including these problematic features.

Plugins generated an entire cottage industry of developers for the platform such as Kai Krause's 'Kai's Power Tools', Extensis PhotoTools, and Alien Skin Software's 'Eye Candy'. Other competing digital imaging applications also accepted to 'host' some Photoshop-native plugins including Paint Shop Pro, PhotoDeluxe and 3DMax (Heim, 2014). The release of Photoshop's software development kit (SDK) meant that Photoshop was not only a tool for digital imaging, but also a platform for developing digital imaging tools.

Combined, these three design characteristics ensured that the application could be taken-up by any field of cultural production involving digital imaging: from fashion

photography to web design, from user experience design in videogames to scientific imaging for virologists. As a result, digital image creation and editing through Photoshop was configured to encompass multiple cultural fields.

Biographies of Photoshop users

Because of its deployment in different kinds of workflows, a historical account of using Photoshop from the perspective of a single cultural field would be incomplete. This section turns to an analysis of how people used Photoshop as part of their professional and personal lives, focussing on how people practiced digital imaging in a wide range of different fields including: graphic design, user experience design for videogames, animation, photo-journalism, advertising photography, and education.

While Photoshop's design made it particularly conducive to material reconfiguration, particularly with the availability of plugins, most of those interviewed for this research did not alter Photoshop from its 'out-of-the-box' state. Instead, Photoshop users discussed digital imaging in the context of their own field of practice. Through their accounts, it was possible to discern how they used Photoshop as a means of configuring practitioners by ordering their own cultural subjectivities in relation to the application as well as those of others.

The following analysis draws on 23 interviews with Photoshop users conducted between mid–2012 and early–2014. These interviews were part of a larger research project involving a cultural biography of Photoshop that also included document analysis and participant observation. The interviews were conducted in London, England and Vancouver, Canada. The length of interviews ranged from 45 minutes to more than 90 minutes. Following their transcription, the interviews underwent a thematic analysis. Four themes identified in the analysis are discussed below.

'Photoshop ratios'

A common statement within much of the literature on Photoshop was that practitioners could only know or use a limited portion of the application. For example, Pfiffner's (2003:

121) history of Adobe cited the author and photographer John Paul Caponigro as saying: 'If Ansel Adams were using Photoshop – and he would be using Photoshop, without any doubt – he'd only be using 25 percent of it.'

The exact ratios in such statements – 25 percent or 1 out of 10 – were unimportant. Rather, these statements generally referred to a skewed proportion between the total amount of features available in the application compared to the amount of features one actually knew and/or used. The practitioners I interviewed applied ratios that were similar to those encountered in the literature in order to describe the extent to which they knew the application:

> *J.V. (male web technician and teacher) 'I think I probably use 10% of Photoshop's features on a regular basis, if that. I don't think I have to know everything about it.'*

> *J.E. (female photojournalist) 'I don't even know all the things that Photoshop does. I know the basics of Photoshop. I know the basics very well. Am I a pro at the basics? Yes. Am I a pro at Photoshop in general? No. Because I'm not familiar with everything that Photoshop does or what you can do in Photoshop.'*

'Photoshop ratios' in interviewees' accounts of their experiences seemed consistent with Fuller's 'feature mountain' discussed above. They also reflected a position identified in scholarship on the perpetual upgrade economy whereby consumers of digital products continually revise and improve their knowledge of software due to upgrades. But few participants expressed these ratios with anxiety. Instead, most seemed rather ambivalent about this state of affairs. In many cases it even served rather counter intuitively as a mark of experience. Photoshop's vast mountain of features and continuous upgrades meant that users had to consider what aspects of the application were relevant to their own practice. Acknowledging one's limited grasp of Photoshop signalled that the practitioner could sort out the difference between professional skill and technological knowledge:

> *G.A. (male graphic designer): '[...] I use it for professional means but I would never say I was a professional photoshopper.'*

> *Interviewer: 'OK. What would be the distinction?'*

> *G.A.: 'Oh, I guess I am wise enough to know that there is 90% of Photoshop that I just don't use because I perhaps never cared for it; never needed to.'*

The practitioner quoted above, the head of a small graphic design firm, marshalled the Photoshop ratio* *to distinguish between a professional graphic designer and someone dedicated to using Photoshop. He continued by deploying this classificatory order to prioritize a commitment to aesthetic considerations over a commitment to technology:

> *G.A.: 'I am not the sort of person that will go see what technology, what things you can do, and then try to work a project into that. I do what it is the project needs and then we'll build the technology around that. I have met really proficient people in Photoshop. You [try to] get them to think the other way around: "Is that really relevant to this project, that is, a communication project?" I use it as a means to an ends rather than an end in itself.'*

As with other interviewees, this practitioner established the importance of not being preoccupied with technical components of the tools used to execute work in order to ensure that technological concerns remained secondary to aesthetic ones.

Karin Knorr Cetina's work on 'knowledge objects' provided an interesting perspective on the type of figuration and configuration work taking place through Photoshop ratios. She defined knowledge objects as the 'goal of expert work; and they are also what experts, scientists, etc. regularly profess themselves to be interested in, attracted by, seduced into and attached to' (Knorr Cetina, 1997:12). She distinguished these objects from instruments or tools which were 'available means-to-an-end within a logic of instrumental action' (Knorr Cetina, 1997:10). In this sense, Photoshop represented a seductive object. Those who resisted its temptation claimed a privileged position within their field of practice. By acknowledging the unexplored vastness of the application, practitioners who respected the Photoshop ratio were in effect detaching themselves from its potential grasp and relegating the application to the status of an instrument. This type of experienced practitioner also differentiated between experts who used Photoshop as part of their professional practice and 'Photoshop experts' who were users seduced by its vastness and whose contributions were classified as technological support rather than as creative work:

> *R.B. (Male art director) 'I find that with a lot of people who are proficient at software, it's seldom you'll ever find one who's not ready and willing to help. They really, I think, enjoy the process, they're proud of what they can do and*

they, most times, they love it when someone wants a little help, you know?'

"Finding your own way" in Photoshop

A second and somewhat parallel theme was the importance of 'finding your own way' in terms of learning how to use the application. Many interviewees related that, through a number of different combinations of features and functions, one could attain a certain result or produce a specific effect with Photoshop. Such statements included:

> *G.R. (male photographer) 'What I found was there was so many different ways to do a particular thing in Photoshop. […] One way may not be the best way but it is whatever you are more comfortable with. That's what I found. The way I was doing selection and the way she was doing it were different but at the end it is almost the same.'*

By stressing the importance of finding whatever method most suited the practitioner, interviewees recounted an individual relationship to Photoshop that could only be maintained through constant personal use, play, and experimentation. Such statements also foregrounded the practitioner's own agency, highlighting their creative appropriation of the application while also demoting the contribution of individual features within the application. 'Finding your own way' was encouraged through training. As one female graduate student put it:

> *S.S. (female graduate student) '[…] if I had any questions about what the tools were or how to use them, I would just ask. And the way they taught it to us […] it was more like: 'Try what you can do and if you need help we will help you.' But they didn't sit us down and say one by one what everything did, because there is so much.'*

Those interviewed who also taught Photoshop within institutions of higher learning, either as a profession or as freelance work on the side, confirmed that students were expected to take the personal initiative to learn Photoshop's functionalities by experimenting with it on their own. These findings were also confirmed in subsequent participant observation of teaching and learning Photoshop (see Lesage and Smirnova, 2015).

Those who used Photoshop extensively in their regular production workflow explained the importance of mastering 'hotkeys' – standard keyboard shortcuts that involved a combination of keystrokes for quickly executing specific functions in the application. In some cases, interviewees explained how they devised custom hotkeys or 'actions' – a Photoshop feature whereby users built 'actions that choose what to do based on one of several different conditions' (Adobe, 2014).

Some, like the photographers interviewed, could justify having found their own way in Photoshop based on the aesthetic results of the final image they produced.

Although people from other fields of practice made similar claims about the importance of finding their own way, in some cases production workflow processes demanded certain conventions of practice to facilitate the coordination of work among multiple practitioners. For example, a user interaction designer working in the videogames industry described how certain Photoshop files were circulated between different contributors to a project.

> *T.R. (male user interaction designer): 'We're talking about hundreds and hundreds of layers in these [Photoshop] files, it could be up to over a thousand sometimes, they're very intense.'*
>
> *Interviewer: 'You have [digital document] folders for [storing them]?'*
>
> *T.R.: 'Yes, so you group folders, and then you colour-code that as well. Because we might have a team, or at least another artist that you're sharing work with and I've gotten files before that are not named and you create a new layer and it's like layer number '791' or something and it's so hard to follow what's going on. So just grouping [the layers] and being diligent on creating Photoshop files is a very big thing here, a 'best practices' kind of thing.'*

Producing good work for this user interaction designer entailed learning how to keep Photoshop files and their internal components such as layers organised. As with other accounts, poorly organised Photoshop documents, according to the conventions of the particular field, often betrayed its creator's inexperience. Within such structured workflows, finding your own way implicitly required ascertaining and following the established order of practice.

Photoshop as boundary object

A third theme identified in the interviews was that Photoshop served as a platform for exchanging information with others including across disciplinary boundaries. Susan Leigh Star and James Griesemer (1989) apply the notion of 'boundary object' to examine how particular objects can enable links between different communities of practice. For Star (2010) boundary objects are materials that are used by more than one group of practitioners. They can be abstracted to enable shared use between these groups while also being adapted for specific uses by a specific field of practice. For Fred Turner (2006: 72), boundary objects enable individuals to find 'ways to collaborate and yet retain their individual allegiances to their fields of origin.'

Interview participants pointed to a number of instances in which Photoshop enabled exchanges between disciplines throughout their workflow and beyond. Its mountain of features and continual upgrades meant that practitioners could treat it as an ill structured object that afforded interdisciplinary movement from one field of practice to another through the circulation of files or through the application itself. For example, one photographer could both produce digital images for the web and send the same file to others for prepress work on a print publication. Another example was a user interaction designer's account using Photoshop to communicate her ideas about certain characteristics of the project to software engineers, 3D artists, and outside collaborators:

> *N.S. (female user interaction designer): 'Also I'll use [Photoshop] as a feedback kind of tool. […] Because we deal with a lot of partners that are either outsourcers or just people with [the company] in different studios in different countries […] we don't necessarily have the opportunity to have meetings and sit down and talk to them, talk through critiques and stuff like that. So we'll use Photoshop to mock-up certain notes and critiques and stuff like that and send that back to them for whatever art they've worked on.'*

But not all practitioners could conduct these interdisciplinary exchanges from equal positions within their fields of practice. Some had to navigate between different social contexts in which they practiced greater or lesser creative control. An unexpected example of Photoshop as boundary object was how it enabled connections between people's professional and domestic lives. Many interviewees explained how they worked with Photoshop at home. Some had home offices for freelance work while others simply brought their laptops from their workplace to work on projects. In some cases, particularly those who were students or who weren't yet making money from their work at home,

downloading a ‘cracked’ copy of the application alleviated the cost of purchasing a licensed version of the application. Having a copy of the application at work *and* at home meant practitioners could apply their acquired skills to creating family birthday cards or wedding invitations for friends. It also provided an opportunity to connect between family members through play or exchanges of tips and tricks. In one case, an interviewee who developed pedagogical content for a university expressed feeling little aesthetic control over his professional work. He mentioned in the interview that most of his recent work was focussed on video editing with other application software instead of digital imaging with Photoshop. But freedom to play and experiment was afforded through use at home and in his personal life: playing with the application at home with his son, retouching images on online forums such as Reddit, and keeping in touch with his mother, a professional photographer:

> *B.I. (male educational media specialist) [18:14]: ‘[My mother] has a coop student right now. A work placement and she’ll call me and go: ‘Is there anything cool I can teach so and so?’ and I’ll be like: ‘Yeah, have you heard about how to do ‘mini planets’ using the polarising filter?’ […] You know I play around with it and call her up and say: ‘Oh, have you tried this? This might be cool for photos.’ Yeah, I guess there is quite a bit. More in my personal life right now than work, but it depends again on working.’*

Photoshop has blurred the distinction between home entertainment and professional work with personal computers since its release (Slater, 1995: 130–131). The visible pleasure that B.I. took from using Photoshop was not realised through paid work but his figuration of a creative practitioner could take shape in an informal domestic setting. Domestic exchanges between family members involved the more ‘gimmicky’ features like the polarising filter example above; indulging in more playful, less disciplinarily sophisticated, experiments. The domestic space afforded social connections to information beyond a specific cultural field and an opportunity to explore the application individually or with family outside the confines of the workplace. While the circulation between domestic and professional was in some ways liberating, it also entangled Photoshop with domestic objects and subjects, making it more difficult to produce figurations of autonomous cultural production.

Configuring Adobe designers

Many of the practitioners interviewed were not aware of alternatives to Photoshop for the kind of work they did despite the availability of open source alternatives for digital imaging

like GIMP. Even those who were aware of alternatives did not seriously entertain the notion of switching to a different application. In one exchange with a designer who co-managed a small graphic and web design team:

> *A.A. (Male graphic and web designer): 'We could probably switch to Sketch, and I think it would probably do everything we need to do. We'd just have to get used to working slightly differently. But there, you'd be using probably 95% of the feature set. It's much, much more relevant to this kind of digital design. Where Photoshop is just this beast that you can do anything with basically and they never have any interest in actually focusing it, they just build on top of it.'*

In a similar way to the Photoshop ratios above, users ambivalently responded to Photoshop designers' strategy of creating a feature mountain as both a strength and a limitation. Just as designers configured the user into their design of the application, practitioners configured a particular type of 'designer' into their use of the application. When discussing the source of Photoshop's design, very few interviewees identified the Knoll brothers as the original authors of the application. Instead, most referred to an abstracted 'they' or 'Adobe' as the creators and stewards of the application. This 'they' was credited with producing an essential industry standard while also chastised for its lack of innovation or clarity. Despite continuous upgrades and new product releases, Adobe and its stable of applications represented a source of inertia. Photoshop's status as the incumbent positioned Adobe as an uninspiring and conservative application designer:

> *A.A. 'There are companies that inspire you with the way they're led or the decisions they make. […] They created this set of products a very, very long time ago and then they're clear leaders for a long time and now they're just kind of sitting in that… just try and stay entrenched.'*

What remains unclear, and beyond the scope of this particular paper, is the extent to which these and other user figurations and configurations were fed back into Photoshop's design. Such developments are of particular relevance in the context of Adobe's recent turn to a 'software as a service' model for Photoshop and other related products (Lesage 2014–15).

Photoshop as middlebroware

In a way, the French triple meaning of ‘moyen’ as ‘middle’, ‘middling’ and ‘means’ seems particularly apt as a summary of the Photoshop themes identified above. Its design and use was riddled with contradictions: on the one hand it was too complex, it was dated, and it represented a seductive distraction from more important concerns and commitments; on the other hand it was an indispensible industry standard that afforded considerable flexibility for various creative practices. As the analysis of both its design and use has shown, this contradiction stemmed in part from its status as middlebroware – as commoditised media software whose configuration of creativity and the technological was not bounded to a committed field of practice. Its status as middlebroware made it difficult to disentangle the figuration of a cultural subject or object that could be submitted to sustained aesthetic considerations and critique which may help to explain its longstanding success and why it has garnered so little of the critical attention required to support alternatives.

Conclusion

I would now like to return to the two sets of questions raised in the introduction in light of the above analysis of Photoshop as middlebroware. The study of middlebroware as a type of media software provides insights into how commoditisation and creativity, design and use, are configured by social actors as categories for the production of culture. The analysis does confirm that Photoshop, as an example of media software, constrained the symbolic possibilities for defining an empowered cultural subject through use. But this limitation was not universal, nor was it simply due to its formal properties. Instead, different practitioners developed tactics to approach its complex entanglements to commoditisation, creativity and technological knowledge in attempts to figure cultural subjects. Some users made a distinction between their position within their field and their use of the application–for example, through Photoshop ratios. One’s ability to achieve cultural status was therefore not exclusively defined by formal orders of subjectivity, such as a distinction between programmer and user application software, so much as differentiations between practitioners whose technological commitments were entangled between the boundaries of cultural fields and those practitioners whose aesthetic commitments produced a clear cultural figuration based on disentangling one’s creative practice from a commitment to middlebroware.

While the above case study focused on Photoshop, the conceptual framework based on middlebroware developed in this paper has potential implications for the study of other media software including other application software as well as social media and SDKs. Digital cultural artefacts, including media software, are subjected to multiple orders of worth including forms of commoditisation that create symbolic and affective entanglements that in turn position subjects and objects to a 'moyen' positionality.

Biographical Note

Dr. Frédérik Lesage is an Assistant Professor in the School of Communication at Simon Fraser University (SFU). He completed his PhD research at the London School of Economics and Political Science (LSE) in 2009 on the topic of art/science research in the field of high performance computing, examining how artists and scientists collaborate to develop digital platforms. Prior to his appointment at SFU, Frédérik taught at King's College London, the LSE, and the University of Cambridge. His current research interests are focused on applying mediation theory to our understanding of how consumer-driven creative digital tools like Photoshop are designed and used. He is a regular contributor to the Canadian Media Fund's Trendscape blog and his research has been published in international journals including *Leonardo*, *Digital Creativity*, *Journal of Broadcasting and Electronic Media* and *Convergence*.

References

Adobe. 'Adding conditional actions | CC, CS6', Photoshop Help, (2014), http://helpx.adobe.com/photoshop/using/conditional-actions-creative-cloud.html

Battani, Marshall. 'Organizational Fields, Cultural Fields and Art Worlds: The early effort to make photographs and make photographers in the 19th-century United States of America', Media, Culture and Society 21.5 (1999): 601–626.

Barbrook, Richard, and Cameron, Andy. 'The Californian Ideology', Science as Culture, 6.1 (1996): 44–72.

Bergvall-Kåreborn, Birgitta, and Howcroft, Debra. 'The Apple Business Model: Crowdsourcing mobile applications', Accounting Forum, 37.4 (2013): 280–289.

Boltanski, Luc, and Chiapello, Eve. The New Spirit of Capitalism, trans. Gregory Elliott (London: Verso, 2005).

Bowker, Geoffrey C., and Star, Susan L.. Sorting Things Out: Classification and its consequences. (Cambridge, Mass.: MIT Press, 2000).

Bourdieu, Pierre. The Field of Cultural Production: Essays on art and literature. (Cambridge: Polity Press, 1993).

Bourdieu, Pierre, Castel, Robert, Schnapper, Dominique, Chamboredon, Jean-Claude, and Boltanski, Luc. Photography: A middle-brow art, trans. Shaun Whiteside (Cambridge: Polity Press, 1990).

Brown, C. Wayne, and Shepherd, Barry J.. Graphics file formats: Reference and guide. (Greenwich, CT: Manning Publications, 1995).

Buckingham, David. 'A Commonplace Art? Understanding Amateur Media Production.' In David Buckingham and Rebekah Willet (eds.) Video Cultures: Media Technology and Everyday Creativity (New York: Palgrave MacMillan, 2009), 23–50.

Couldry, Nick. Media, Society, World: Social theory and digital media practice. (Cambridge, UK: Polity Press, 2012).

De Duve, Thierry. Kant After Duchamp (2nd ed.). (Cambridge, Massachusetts: MIT Press, 1997).

Deuze, Mark. Media Work. (Cambridge: Polity Press, 2007).

Dovey, Jon, and Kennedy, Helen W. 'From Margin to Center: Biographies of technicity and the construction of hegemonic games culture', In J. Patrick Williams and Jonas H. Smith (Eds.), The Players' Realm: Studies on the culture of video games and gaming (Jefferson, N.C.: McFarland & Company, 2007), 131–153.

Fuller, Matthew. 'It looks like you're writing a letter', Telepolis, 7 (2001), www.heise.de/tp/druck/mb/artikel/7/7073/1.html

Garnham, Nicholas. 'From Cultural to Creative Industries: An analysis of the implications of the 'creative industries' approach to arts and media policy making in the United Kingdom'. International Journal of Cultural Policy, 11.1 (2005): 15–29.

Government of Canada. 'Graphic Arts Technician', September 3 (2013), http://www.service-canada.gc.ca/eng/qc/job_futures/statistics/5223.shtml

Grudin, Jonathan. 'The Computer Reaches Out: The historical continuity of interface design'. In CHI (Ed.), (Vol. CHI '90 Proceedings, pp. 261–268). (Presented at the ACM SIGHI Conference, ACM, 1990).

Heim, Harald. 'Plugin Essentials', The Plugin Site: Your guide to Image and Video Effects, (2014), http://www.thepluginsite.com/knowhow/tutorials/introduction/introduction.htm#1b

Hesmondhalgh, David. The Cultural Industries (2nd ed.) (London: Sage, 2006).

Hope, Kristin Lofthus, and Amdhal, Eva. 'Configuring designers? Using one agile project management methodology to achieve user participation', New Technology, Work and Em-

ployment, 26.1 (2011): 54–67.

Howe, Denis. 'Middleware', Foldoc. Imperial College Department of Computing. (1985), http://foldoc.org/middleware

Knorr Cetina, Karin. 'Sociality with Objects: Social Relations in Postsocial Knowledge Societies', Theory, Culture & Society, 14.4 (1997): 1–30.

Kline, Stephen, Dyer-Witheford, Nick, and de Peuter, Greig. Digital Play: The interaction of technology, culture and marketing. (Montreal: McGill-Queen's University Press, 2003)

Kopytoff, Igor. 'The Cultural Biography of Things: Commoditization as process'. In Arhun Appadurai (Ed.), The Social Life of Things: Commodities in cultural perspective (Cambridge: Cambridge University Press, 1986), 64–91.

Lash, Scott, and Lury, Celia. Global Culture Industry: The mediation of things (Cambridge: Polity Press, 2007).

Lesage, Frédérik. 'Cultural Biographies and Excavations of Media: Context and process', Journal of Broadcasting and Electronic Media, 57.1 (2013): 81–96.

Lesage, Frédérik. 'Reviewing Photoshop: mediating cultural subjects for application software'. Convergence, (digital first 2014–2015).

Lesage, Frédérik, & Smirnova, Svetlana. '"Keeping up" through Teaching and Learning Media Software: "Introducing" Photoshop'. Canadian Journal of Communication, 40.2 (2015): 223–241.

Lievrouw, Leah. Alternative and Activist New Media. (Cambridge: Polity Press, 2011).

Mackenzie, Adrian. Cutting Code: Software and sociality. (New York: Peter Lang, 2006).

Manovich, Lev. 'Import/Export', In Matthew Fuller (Ed.), Software Studies\ a lexicon (Cambridge, MA.: MIT Press, 2008), 119–124.

Manovich, Lev. 'Inside Photoshop', Computational Culture, 1 (2011): 1–12.

Manovich, Lev. Software Takes Command. (New York: Bloomsbury Academic, 2013).

McRobbie, Angela. "Everyone is creative"; artists as pioneers of the new economy? In E. B. Silva and T. Bennett (Eds.), Contemporary Culture and Everyday Life (Durham, UK: Sociology Press, 2004), 186–199.

O.E.D. 'Photoshop v.' Oxford English Dictionary. Oxford: Oxford University Press. (2006), http://www.oed.com/view/Entry/260649

Poole, Lon. 'Pictures Perfected', Macworld, 8 (1991): 144–151.

Rushkoff, Douglas. Program or be Programmed: Ten commands for a digital age. (New York: OR Books, 2011).

Schewe, Jeff. 10 Years of Photoshop: The birth of a killer application. Photo Electronic Im-

aging Magazine, (2000, February): 16–25.

Shustek, Len. Adobe Photoshop Source Code. Software Gems: The computer history museum historical source code series (2013), http://www.computerhistory.org/atchm/adobe-photoshop-source-code/

Silverstone, Roger, and Haddon, Leslie. 'Design and the Domestication of Information and Communication Technologies: Technical change and everyday life', In Robin Mansell and Roger Silverstone (Eds.), Communication by Design: The politics of information and communication technologies (Oxford: Oxford University Press, 1996), 44–74.

Singerman, Howard. Art Subjects: Making artists in the American university (Berkeley, Cal.: University of California Press 1999).

Slater, Don. 'Domestic Photography and digital Culture. In Lister, Martin* (Ed.) The photographic image in digital culture* (London: Routledge 1995), 129–146.

Star, Susan L.. 'This is Not a Boundary Object: Reflections on the Origin of a Concept', Science, Technology and Human Values, 35.5 (2010): 601–617.

Star, Susan L., and Griesemer, James R.. 'Institutional Ecology, "Translation" and Boundary Objects: Amateurs and Professionals in Berkeley's Museum of Vertebrate Zoology, 1907–39', Social Studies of Science, 19 (1989): 387–420.

Sterne, Jonathan. 'Bourdieu, Technique And Technology', Cultural Studies, 17.3–4 (2003): 367–389.

Suchman, Lucy. 'Configuration'. In Celia Lury and Nina Wakeford (Eds.), Inventive Methods: The happening of the social (London: Routledge 2012), 48–60.

Tukey, John W.. 'The Teaching of Concrete Mathematics', The American Mathematical Monthly, 65.1 (1958): 1–9.

Turner, Fred. From Counterculture to Cyberculture: Stewart Brand, the Whole Earth Network, and the Rise of Digital Utopianism. (Chicago: University of Chicago 2006)

Voss, Alex, Harstwood, Mark, Procter, Rob, Slack, Roger, Büscher, Monika, and Rouncefield, Mark. 'Introduction: Configuring User–Designer Relations: Interdisciplinary Perspectives'. In Alex Voss, Mark Harstwood, Rob Procter, Mark Rouncefield, Roger Slack, and Monika Büscher(Eds.), Configuring User-Designer Relations: An interdisciplinary perspective (London: Springer 2009), 1–12.

Wikipedia. 'Middleware'. In Wikipedia. Wikipedia. (2014, June 26) http://en.wikipedia.org/wiki/Middleware

Woolgar, Steve. 'Configuring the User: The case of usability trials'. In J. Law (Ed.), A Sociology of Monsters: Essays on Power, Technology and Domination (London: Routledge 1991), 57–99.

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