MEDIA ART HISTORY

POST-DIGITAL WORKSHOPS IN CO-CREATION AND CO-DESIGN

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Resumen / Abstract

This paper examines how workshopping serves as a site for exploring entangled perspectives on technology and co-creation. Through two projects—*Hotwire~* and *Copy Copy Shop*—we investigate hands-on engagement with materials and media as a means of renewing and preserving tools and practices. These projects embrace 't(h)inkering' (Huhtamo, 2010) and explore the regenerative possibilities of encountering more-than-human worlds.

Hotwire~ (2009), an arts collective initiated by David Strang and Andrew Prior, uses t(h)inkering—the dual practice of thinking through tinkering and vice versa. Participants repurpose and reconfigure signs, signals, and technologies, revealing new possibilities and fostering inventive connections. These critical practices encourage interrogation and play, empowering participants to become reflective makers, menders, and custodians of material practices.

Laura Rosser's *Copy Copy Shop* (2018) reimagines the traditional photocopy shop, through creating workshops to collectively reframe our relationship with print technologies and culture (Ludovico, 2012; Cramer, 2014). It prioritises liveness (Soon, 2016), error (Stocker, 2018; Williams, 1981) and relational co-creation (Bennett, 2010) of open knowledge and shared labour (Gulli, 2019) over accurate reproduction. By tinkering with printers and affordable single-board computers, the project moves away from conventions of accuracy, logic, and order.

Both projects illustrate how post-digital workshops can cultivate vibrant self-sustaining communities of practice focused on DIWO (doing it with others) rather than DIY (doing it yourself) (Garrett & Catlow, 2013). The workshops promote open knowledge, encourage the re-use of materials/equipment and re-thinking ideas of being outdated or obsolescent, and foster circular dynamics through critical engagement with both old and new technologies. The paper argues that these practices challenge traditional notions of consumption and reproduction, offering a space for alternative modes of interaction with technology that attempt to 'realign human and technical cognitions' (Hayles, 2017, p. 14) and rethink how we might better articulate human and mechanical or computational agencies.

Palabras Clave / Keywords

DIWO, Workshopping, Unlearning, Liveness, Entanglement

Introducción / Introduction

‘The machine is always social before it is technical.’ (Deleuze, 1988, p.34)

This paper examines the potential of DIWO (Doing It With Others) workshopping to explore critical, embodied and entangled perspectives on technology and co-creation. We discuss two projects—*Hotwire~* and *Copy Copy Shop*—that both emphasise hands-on co-worlding with materials and media, renewing and repositioning participant relationships with objects, materials, tools and practices.

Our discussion of both *Hotwire~* and *Copy Copy Shop* together is not merely due to our co-authorship; rather, it highlights shared concerns, methodologies, and critiques. Both initiatives work to decenter expertise by fostering non-hierarchical learning spaces where skill-sharing and experimentation are prioritised**.** Instead of reinforcing technological determinism, they engage critically with media and resist assumptions of progress.

Both share a post-digital ambivalence, questioning technological progress rather than accepting it uncritically. *Copy Copy Shop* foregrounds the continued relevance of analog and digital print processes, while the other interrogates the labor, knowledge, and authorship embedded in digital networks. Both embrace collaboration and conviviality, recognising that print workshops have long been social spaces. One can learn from the embodied, collective practices of printmaking, while the other can draw insights from engagement with digital networks.

Both initiatives also reveal how print is deeply mediated by technique, technology, and culture. By working with specific print technologies—risographs, photocopiers, digital platforms—they expose the material entanglements shaping communication and access to information. Our critique extends beyond particular tools to question broader ideological assumptions about media production.

Given this shared sensibility, our paper will explore *Copy Copy Shop* as a case study reflecting these entanglements. Examining relationships between printers, networks, and infrastructures offers insight into how print—one of the oldest media technologies—shapes our historical and contemporary interactions with machines and information. This longer perspective helps reframe current debates on digital media, grounding them in a lineage of technological adaptation and negotiation.

The term DIWO originated in 2006, in a workshop at London’s *Furtherfield* gallery. The concept was posited in reaction to, among other things, the limitations of DIY. At this point in the development of digital art practices in the 21st century DIY was perceived as a powerful method for reclaiming many aspects of

the working process within technological arts practices and establishing new forms from the ground up. It certainly performed these functions and empowered many artists working with open-source software and hardware to develop their own creative voice. However, as sociologist Richard Sennett discusses in *The Craftsman* (2008), the idea of *Homo Faber*—humans as makers who shape their world through practical skills, labor, and craftsmanship—highlights a fundamentally individualistic approach. In this sense, DIY, while transformative, remains rooted in the solitary framework of Homo Faber, emphasising self-reliance over collective creation. Furtherfield developed the DIWO approach, using peer to peer networks and community practice as the foundations of a grassroots movement to empower relations between people. Unsurprisingly for the time, this did not explore more-than-human entanglements, (Strang, 2024) instead, reinforcing a hierarchical structure of a creative master from which all skills and knowledge then flow. From a workshop perspective, including the more-than-human within the 'others' of DIWO is a key step forward, since it presents a rich set of opportunities for addressing the regenerative needs of climate and culture that are simultaneously social and political, ethical and technological, since it shifts the focus from centering on the individual and humans – to a palpable focus on that which is outside us.

The technological imaginary (both its detritus and dreams) is a relational network in which it is now vital to recognise the more-than-human as more than simply 'raw materials'. Vibration motors, lasers, paper and plants have histories, cultures and agencies. Engaging with the specificities of objects–their operativity, history, semiotics, ontology–opens up many worlds, creates new possibilities, new imaginaries, sensitivities and encounters. We are advocating here for relationships/entanglements over either exclusively human- or object-centred foci. We therefore conclude by considering the implications of artists and designers co-creative entanglement with the more-than-human, for establishing a world of many worlds.

Unlearning Through Doing

From John Dewey and Jane Addams[1] to Paulo Freire and Seymour Papert, experiential learning has been seen as a way to concretise and optimise learning. However, for us, workshopping plays an almost opposite but equally important role—providing a space for unlearning, decentering, and defamiliarisation with technologies.

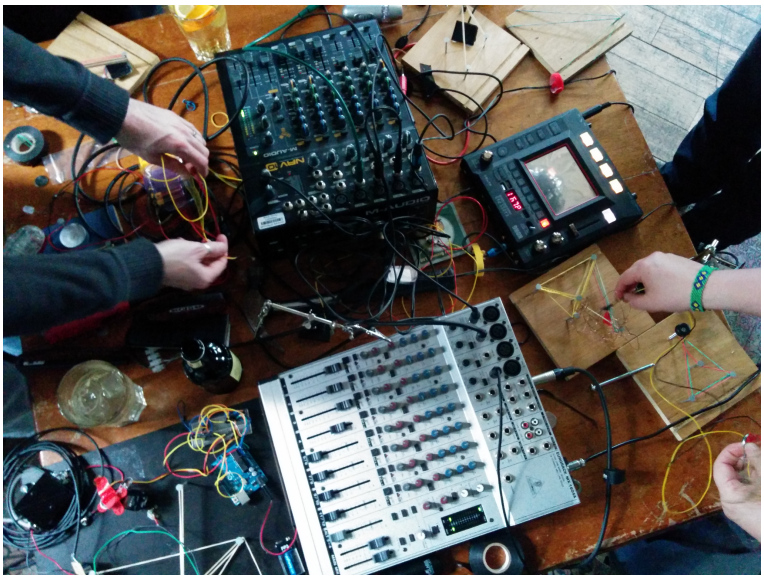
As Arturo Escobar notes, 'Design has been a fundamental political technology of modernity and hence of unsustainability. To reclaim design for other world-making projects requires a renewed consciousness of

[1] Addams writes that learning "has to be diffused in a social atmosphere, information must be held in solution, in a medium of fellowship and good will" (Twenty Years at Hull House, 1929 427) (Shah 2014,p.35)

this historicity.' (2017) His insight underscores the need to critically examine design and technology as historically situated forces shaping aesthetics, function, and broader political, social, and ecological realities. This is difficult since, to paraphrase Friedrich Kittler, 'Understanding [design and technology] remains an impossibility precisely because the dominant information technologies of the day control all understanding and its illusions.' (1999, p.xl) Our relations with technology and design are obfuscated by the very systems that mediate our understanding—information technologies, media, and hype shape perception, dictate discourse, and invisibly embed assumptions.

Like many critical making, hacking, and artistic research approaches, *Hotwire~* and *Copy Copy Shop* interrogate the material and ideological underpinnings of design objects. *Hotwire~* is an interactive arts collective founded in 2009 in Plymouth, UK, by Andrew Prior and David Strang. Emerging from collaborations in exhibitions and performances, the collective sought to facilitate cross-disciplinary skill-sharing while flattening hierarchical structures. Inspired by DIWO and labs such as *Eyebeam* (US) and *Mediashed* (UK), the collective was initially launched within a university context, but this limited its reach while placing an overly constrained academic and didactic relation between participants and the collective. Relocating to a pub in the city centre allowed a more diverse community to flourish in both these regards. Hosting workshops, talks, exhibitions, and performances across varied venues, *Hotwire~* activities culminated in the first *unSymposium* (2016), inviting international practitioners. Workshops often involve experimenting with lo-fi and obsolete technologies—printers, Arduino boards, sensors, motors—to critically engage with material culture.

Figure 1. Elastic Band Drone Machine, The Bread And Roses, Plymouth (UK)



Source: Hotwire~, 2015.

A core principle of both *Hotwire~* and *Copy Copy Shop* is the decentering of expertise—both from workshop instructors and officially sanctioned techniques. For example, *Hotwire~* encourages participants to take turns leading sessions, shifting authority from a singular instructor, while workshops emphasise open-ended experimentation and play. Topics have ranged from exploring resonance and vibration through transduction, to building instruments with rubber bands or interfaces with Makey Makey. This approach aligns with the concept of 't(h)inkering' (Huhtamo 2010), merging tinkering and thinking to create a space for reflection and critique. Like the Structuralist concept of 'bricolage,' thinkering implies manipulation, interrogation, and reconfiguration of existing sources. However, it also emphasises the material, processual, and ontological registers of all signs, as well as the semiotic and social meanings of tools and technologies. These materials not only possess agency but, once embedded in circuits or mechanisms, become operative (Kittler 1999, Ernst 2011). Thacker encapsulates this in his discussion of networks:

> Information networks like the internet are always about to do something. In this sense, networks are constantly materializing their logics (their formal logics as much as their organizational and political logics). (Thacker in Galloway, 2004, p.xiv)

Galloway's emphasis on technical specificity and expertise is important but not exhaustive. Social, semiotic, and relational aspects also operate at different registers. Over time, the collective expanded its focus beyond human-centred concerns to actively engage in discourse on the more-than-human. While awareness of the technical specificity of technology is valuable, workshopping seeks not only to analyse existing structures but to imagine otherwise—to conceive many worlds. The inexpert, playful, and ad-hoc aspects of thinkering are central, shifting focus from goal-oriented design to its broader implications. This open-ended engagement with materials allows participants to interact with objects on their own terms, highlighting the agency and 'thing-power' (Bennett, 2010) of materials. A flat ontology encourages consideration of agency, materiality, signification, and relational dynamics, raising questions of reciprocity and symbiosis with both objects and the diverse communities they intersect. This requires unlearning—rather than reinforcing assumptions about technology's purpose, workshops encourage participants to rethink their relationships with these tools. As Tim Ingold states:

> "Learning to learn [...] means shaking off, instead of applying, the preconceptions that might otherwise give premature shape to their observations." (2013, p.2)

This resonates with Matt Ratto's concept of critical making, in which reflection and dialogue take precedence over finalised design objects (2011). Rather than seeking polished outcomes, workshops function as spaces where making becomes a means of inquiry and community-building. As Ratto argues, this reflexivity transforms technology from a 'matter of fact' into a 'matter of concern,' demanding a personal investment often absent in technical and social scholarship: 'I see this as requiring personal investment, a 'caring for' that is not typically part of either technical or social scholarly education.' (2011, p. 259) In retrospect, these matters of care can be seen as incorporating more-than-human perspectives.

Liveness and Uncertainty

The workshop is a dynamic system of shifting agency and information. It moves between bodies-human or otherwise-including plastic printer bodies, bodies of knowledge, (non)conscious thought, printed matter, and the crackle of lo-fi systems. The threshold for interaction in *Hotwire~* and *Copy Copy Shop* is determined by feedback loops that do not prioritise the human over the more-than-human (Hayles, 1999, p. 27) and by purposefully surrendering to failing and uncertainty (Cocker, 2016).

Copy Copy Shop (2018 ongoing) is a reimagining of the traditional photocopy shop. The project consists of workshops that reframe our relationship with print technologies (Ludovico, 2012; Pettersson, 2017), human and machine labour (Latour, 2005; Gulli, 2019), liveness (Soon, 2016) and uncertainty (Cocker, 2016). The workshops are low-tech, using simple means to link old print equipment, paper and the internet. They have taken place at artist book fairs, artist-led spaces and galleries, publishing workshops and art festivals.

In 2024 *Copy Copy Shop* ran a live printing laboratory to explore ideas around breakdown and unruly bodies (see image 2 and 3). Participants and technologies formed an assembly line hacking print tech, including 1980s dot matrix printers, Arduino boards, hand scanners and shredders. Working with old, faulty technologies uncovers creative possibilities to consider sociopolitical and technological logics, such as machine labour, automation and the copy, through collective acts of tinkering and producing (badly) printed ephemera. Liveness, errors, co-creation and shared human/machine labour were prioritised over accurate reproduction (Gulli, 2019).

Figure 2 and 3: Copy Copy Shop, CAST (Cornubian Arts & Science Trust) Helston, Cornwall UK. 2024.

Source: Copy Copy Shop, 2024.

Participants and redundant technologies worked in tandem, creating an environment of unpredictability, where reimagined print technologies, bodging, and low-tech DIWO approaches opened up opportunities for deviation and unlearning. As participants, we operated as part of the relational whole, as mediators of complex entanglements between more-than-humans and humans. Hands clutching a tool or printer ribbon are mediators in a chain of production (Kittler, 1999; Hayles, 1999). In this way, liveness in workshopping emerges through relational agency (Latour, 2012; Bennett, 2010), coming into being only in the moment of interaction between participants and materials. This aligns with Thacker's earlier proposition that systems are perpetually on the brink of action, constantly materialising their formal, organisational, and political logics, as seen in the continuous potential of networks like the internet.

How can action be shared between humans and more-than-humans? Katherine N. Hayles *Unthought* (2017) provides a useful framework for theorising how humans and technologies think (without thinking). Hayles's outlines how cognitive processes apply to both human 'nonconscious' thoughts and also significantly to data and technological systems. The lively activity of workshopping, focussing on the body and its interaction with machines, is a call to synchronise human and technical cognitions (Hayles, 2017).

At Bristol Artist Book Event (BABE) 2019, old print technologies were manipulated into a portable POD (print on demand) service (see images 4 and 5). The POD Portable Unlearning Zone consisted of 3 levels: Coding, design and print; finishing; and power (wheelchair batteries). It roamed BABE producing live personalised user guides for the public, embracing post digital approaches, both in its use of (obsolete) dot matrix printing, networked using Arduino, and by moving away from conventions of accuracy, logic, and order, to emphasise live interaction. The PODs portability placed print practices within a social environment, supported by a 'donate what you can' payment model (Cramer, 2014).

Figure 4 and 5: Copy Copy Shop, BABE (Cornubian Arts & Science Trust) Helston, Cornwall UK. 2024.

Source: Copy Copy Shop, 2024.

Liveness is inevitably associated with the speed of digital technology, although it also accounts for the relationship between more-than-humans and humans. Winnie Soon pays critical attention to liveness beyond human perception, considering unpredictability, automation and temporality. Soon describes the way 'technology becomes live [...] not only for us but also for-itself and for other beings that are beyond the scope of human reasoning and understanding' (2016, p. 41).This emphasises the threshold between

knowing and not yet knowing, shifting the focus from outcomes to non-teleological activities (Cocker, 2009), foregrounding the potentiality of non-knowing. Uncertainty has potential to open new thinking; it upholds new beginnings.

In this way, workshops generate experiences for creating together that are composed of contingent activities and apparatus (Fazi, 2018). These acts of critical making are rooted in thinking-through-doing that happens in the moment. The process of making unfolds in real-time, but it also loops and transforms across different timescales creating multiple dimensions and transformations of time. The idea of real-time – which is somewhat problematic in itself – exposes a tension between liveness and the unpredictability of obsolescent technologies, ad-hoc systems, and associations of static printed matter. *Copy Copy Shop* contributes to the exposure of this tension, evidencing how live printing workshops are capable of giving rise to new live and uncertain effects. Charlotta Ruth writes of a meta-liveness (n.d.), where time becomes stretched, looped, and we become more aware of before, now and after. Borrowing from Ruth's manipulation of time, ideas of liveness become warped, and distorted, allowing us to reimagine the body's role within technological systems, creating opportunities across and through time (Andrews, 2021). By attempting to fold, warp or stretch time, we ask what and how histories might be re-told, and consider new conceptions of histories and connecting 'the no-longer to the not-yet' (Larsen, 2021).

DIWO with Unknown Entanglements

> 'DIWO is a manifestation of grounded explorations and collaborations between networked peers, whose practices involve an open mixing of components from different sources, building new hybrid art experience.' (Catlow & Garrett cited in O'Hara & Bradbury, 2019, p. 63)

DIWO moves us beyond the *Homo Faber* (Sennett, 2008) position mentioned in this paper's introduction. However, this is not a straightforward task of simply shifting focus away from humans to objects and things, since this can only serve to reinforce the subject-object perspective. More-than-human power and agency must be understood along *with* the human; not instead of or in place of the human. This power and agency is, following from Jane Bennett's discourse on 'the force of things' and 'the agency in assemblages' (2010), an affect distributed throughout the workshop environment from all participants (more-than-human and human). When Bogost argues that posthumanism is not posthuman enough (2012) and more is required to

embrace objects and things, this is done within the remit of creating a flat ontology, not to completely ignore the human but instead to bring things and their powers into the field of action – in the case of *Hotwire~* that is a creative field of action. We agree that posthumanism has for too long focused too much on the human and that through entangled DIWO practices a flattened ontology where humans and things work-*with* one another sets up environments that need to be encouraged.

To simply shift focus onto things though is to fall into the trap of what Haraway describes as 'the trick of God view' (1988) where that view is from outside both knowledge and experience. DIWO methodologically supports Haraway when she calls for a 'situated knowledge' that requires 'knowing-*with'* (1988). In the workshop practice of *Hotwire~,* DIWO operates through diffracted fields of knowledge within human participants and within knowledge created through interactions with things, objects, and materials as well as through their intra-actions (Barad, 2007). DIWO encourages the shift of moving beyond interactions with things and engages forcefully with intra-actions which enables a complex mixing of things where their hidden powers are therefore surfaced and realised through entanglements with other things. This intra-action is occurring at both the physical and conceptual level. The physical engagement between more-than-human and human is key to the development of new knowledge and skills within these workshops. The hand becomes intimately entangled with electronics, dirt, heat, vibration, and code in a manner that connects Leroi-Gourhan's discourse of 'thinking with one's fingers' (Ingold, 2013) with Erkki Huhtamo's term of 'thinkering'. These actions of thinking-through-doing arise from our posthuman and post-digital condition – *Hotwire~* is concerned with how to address the de-skilling in communities that have shifted into modes of passive consumption. Within the practice of workshops, the hand is once again confronted with materials of powerful agency. The combination of flesh and more-than-flesh develops a unique intra-active state that can only be realised within communities that embrace DIWO within an alien phenomenological perspective (see Bogost, 2102 and Bryant, 2011); i.e. ontologically flat. This flatness that DIWO affects produces the unique position of what Whitehead describes as 'prehension' or 'lure for feeling' (1978). In our post-digital state, fingers and things, objects and flesh register the presence of, respond to or are affected by one another. This is the formation of an entanglement of forces expressing anew.

The entanglements at play within the creative workshop offer the platform for Barthes' 'punctum' (1981) or Arendt's 'natality' (1958) where the intra-actions create ruptures of the new that call for the attention of all more-than-human and human participants in the workshop. These ruptures are caused through unknown entanglements, collisions in-between the participants of the workshop assemblage. Throughout the assemblage the performativity and liveness of things brings about states where things and their intra-actions

‘stand(s) up or create(s) its own momentum, its own block of sensation, its own field of forces.’ (Manning, 2015) Of the points listed in the DIWO manifesto it is here, where active entanglements between the more-than-human and human affect something new into existence and the ontological flattening occurs where ‘humans are no longer monarchs of being, but are instead among beings, entangled in beings, and implicated in other beings.’ (Bryant, 2011 p.40)

The ‘field of forces’ mentioned above, sets up, through a reading of Deleuze and Guattari, the dynamics of assemblages and territories that form the worlds of creative workshops. DIWO encourages the dynamic interplay of forces (prehension, intra-action) but is rooted in the less dynamic worlds of networks. As stated by Strang (2024) DIWO could be developed to engage more in the messy complexities of assemblages and co-worldings inspired by more-than-human intra-actions. In the making of workshops, *Hotwire~* is engaged in the making of worlds complete with their resonant inter-actions and intra-actions. When Escobar (2018) details the relational ontologies of mangrove forests complete with ‘complex weavings of water, minerals, degrees of salinity, forms of energy’ (2018, p.70) he details the difficulties in mapping the complexities of these worlds. The same is true of creative workshops within a DIWO context complete with weaving of sound, solder, electronic components, vibrational energy, hands, and minds. These are complex worlds constantly performing in states of becoming and it is here where DIWO needs to be updated to embrace ‘co-worldings inspired by […] non-human intra-actions.’ (Strang, 2024) This co-worlding is a call, therefore, to embrace not only more-than-humans and humans but, crucially, their relations as Escobar resonates with Whitehead in stating ‘things and beings *are* their relations; they do not exist prior to them.’ (2018, p.70)

Conclusions

We are not suggesting that the 2006 framing of DIWO failed to account for the more-than-human—doing so would be anachronistic. Even then, people were actively considering materiality, affordances, and the implications of technology. Our emphasis on the more-than-human within DIWO is not a critique but rather a shift in focus.

What changes when we explicitly include the more-than-human in workshops and frame workshop relationships as entangled encounters between humans and nonhumans? All participants—human and more-than-human—are affected, transformed, and even ‘contaminated’ (Tsing, 2015 p.27) by these encounters. As Latour (2005) argues, agency is not solely human but distributed across networks of humans and more-than-humans.

Workshopping is enabling us to recognise and engage with new powers within such entanglements. We use the word "realise" in two senses: first, as noticing, and second, as making these powers more present and tangible through that act of noticing. As Bogost suggests, 'ontological flatness' does not mean that all entities hold equal power or influence from a human perspective (2012, p.11). Rather, it acknowledges that all entities have their own ways of existing, acting, and relating—independent of human perception or valuation. Given this inherent 'in-equality' of power, it becomes crucial to counterbalance dominant influences while attending to those that are less apparent. Indeed, this perspective challenges fundamental assumptions about workshops—particularly the role of leadership. Can a workshop function without a traditional leader, emphasising entanglement over hierarchy? How might we recognise evidence of this shift?

Understanding the participation of the more-than-human (ours and theirs) means recognising the ways in which these entanglements introduce a nexus of worlds, times, energies, and folds—often subtle, easily overlooked, but profoundly transformative when noticed, respected, and foregrounded.

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