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Marjolaine Rostain, Jean Clarke

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	efforts to make their working lives more tolerable, such workers are limited to either discursively reframing the significance of their roles or engaging in acts of resistance against the organisation. In this paper, based on an eight-month ethnographic study of a mould-producing company in France, we identify three processes through which workers in low-skilled roles find temporal opportunities to engage in anomalous craft where latent or underused craft skills and attitudes are utilised to enable them to work more autonomously and earn recognition from peers and supervisors rendering their work more meaningful. Our work offers insights into how workers can use craft to activate or re-establish meaning in contexts where work has been stripped of significance.



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3 **Meaningful work through craft: how workers in low-skilled roles engage in anomalous**
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5 **craft to gain autonomy and receive recognition**
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10
11 **Marjolaine Rostain**
12 Warwick Business School
13 Scarman Road
14 Coventry CV4 7AL
15 Marjolaine.rostain@wbs.ac.uk
16

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19 **Jean Clarke**
20 Emlyon Business School
21 144 Avenue Jean Jaurès
22 69007 Lyon
23 Clarke@em-lyon.com
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Abstract

Meaningful work is work that offers a degree of autonomy and the opportunity to receive recognition from others. It is traditionally associated with highly skilled work whereas low-skilled jobs are often equated with meaningless work. Previous research assumes that workers in low-skilled roles have little access to the autonomy or recognition characteristic of highly skilled labour. Rather it suggests that in their efforts to make their working lives more tolerable, such workers are limited to either discursively reframing the significance of their roles or engaging in acts of resistance against the organisation. In this paper, based on an eight-month ethnographic study of a mould-producing company in France, we identify three processes through which workers in low-skilled roles find temporal opportunities to engage in *anomalous craft* where latent or underused craft skills and attitudes are utilised to enable them to work more autonomously and earn recognition from peers and supervisors rendering their work more meaningful. Our work offers insights into how workers can use craft to activate or re-establish meaning in contexts where work has been stripped of significance.

Keywords: Craft, Meaningful Work, Ethnography, Autonomy, Recognition, Low-Skilled Work

Introduction

Work is one of the most important domains from which people derive meaningfulness in their lives (Michaelson, Pratt, Grant & Dunn, 2014). Meaningful work has traditionally been associated with highly skilled roles, with low-skilled work (work requiring minimal formal technical expertise, typically involving mundane tasks with limited opportunities for development) strongly associated with meaningless work (Laaser & Bolton, 2022; Sayer, 2007). Existing literature has suggested that the lack of meaningfulness in low-skilled work is related to the low levels of *autonomy* such workers have in daily tasks, and the absence of *recognition* from others for the value and contribution of their work (Bailey & Madden, 2017; Laaser & Bolton, 2022). Workers in low-skilled roles often carry out highly repetitive tasks or ‘gigs’ in controlled environments, and their work is frequently demeaned and perceived as ‘servile’ or ‘inferior’ (Bailey & Madden, 2017; Dutton, Debebe, & Wrzesniewski, 2016). In contrast, highly skilled work is replete with autonomy and recognition of skills and this ‘foundation for meaning [is] defended against all incursions’ (Hodson, 2007, p. 13; see also Vallas, 2006). As advancements in technology and artificial

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3 intelligence, alongside the growing global demand for service and care workers, continue to
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5 increase the proportion of individuals in low-skilled jobs, it is becoming increasingly
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7 important to understand how such work might be made more meaningful (Gibson,
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9 Thomason, Margolis, Groves, Gibson & Franczak, 2023; Manning, 2004).

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12 The concept of meaningful work originates in the classical writings on industrial
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14 society, where thinkers like Marx, Durkheim, and Engels all highlighted how the erosion of
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16 highly skilled craftwork and the subsequent forced division of labour led to worker alienation
17
18 as workers lost autonomy and recognition (Hodson, 2007; Hodgkiss, 2016). Craftwork is
19
20 considered an inherently meaningful form of work that prioritises ‘human engagement over
21
22 machine control’ (Kroezen, Ravasi, Sasaki, Zembrowska & Suddaby, 2021, p. 5), since
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24 workers engage in ‘creative and meaningful productive activities’ (Hodson, 2007, p. 264) that
25
26 rely on distinct craft skills and attitudes (Becker, 1978; Sennett, 2008). Craft workers have
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28 the autonomy to manage their time, investing it in refining their technique and perfecting
29
30 their craft rather than being bound by rigid externally imposed schedules (Becker, 1978).
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32 When workers’ craft skills are removed and absorbed into organisational processes,
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34 autonomy is lost, and workers are reduced to carrying out simple, repetitive, and mundane
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36 tasks governed by strict schedules and time constraints (Braverman, 1974). Without these
37
38 recognised craft skills, workers are viewed as interchangeable and ‘denied respect and
39
40 recognition’ that comes from engaging in skilful labour (Costa, 2022, p. 8). This includes not
41
42 only workers in industrialised shopfloor or machine-controlled settings (Braverman, 1974)
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44 but also those who work in other low-skill jobs, such as stigmatised ‘dirty work’ (e.g.
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46 cleaners, carers, binmen), who are routinely controlled and devalued (Ashforth & Kreiner,
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48 1999; Gibson et al., 2023).

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51 The assumption in existing work is that the structural constraints imposed on workers
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53 in low-skilled environments including rigid work processes, close supervision and the low
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3 status afforded to such jobs means they cannot achieve the autonomy and recognition that
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5 characterise highly skilled or craft roles. Rather existing research suggests that in their efforts
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7 to make their work more bearable, workers in low-skilled roles are limited to either
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9 discursively reframing the importance of their roles (Tweedie & Holley, 2016; Wrzesniewski
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11 & Dutton, 2001) or resisting the control of the organisation through informal, hidden tactics
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13 such as time-based rituals or games that regulate the intensity of work and offer opportunities
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15 for camaraderie (Korczynski, 2011; Roy, 1959). While providing some reprieve, these
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17 responses do little to allow workers to gain any control over their work or receive
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19 acknowledgement for their efforts. In this paper, we argue that workers may also agentially
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21 navigate these organizational constraints to carve out time for craft through self-initiated
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23 behaviours and informal activities which in turn offers more opportunity for autonomy and
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25 recognition. While existing work presents craft and low-skilled work in opposition to each
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27 other, we suggest such workers can in fact have significant craft skill and find ways to
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29 challenge the rigid structures imposed on them by organisations and exercise their craft skills
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31 within the confines of their jobs to make their work more meaningful (Kroezen et al., 2021).
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38 We ask, *how do workers in low-skilled roles find opportunities to gain autonomy and*
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40 *recognition within their work.* Drawing on an eight-month ethnographic study of shopfloor
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42 workers engaged in highly typical low-skilled factory work at a mould-producing company in
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44 France, we identify three processes through which workers find temporal opportunities to do
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46 what we term '*anomalous craft*' i.e. the agential implementation of latent craft skills and
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48 attitudes within the formal work process in low-skill controlled settings, leading to more
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50 autonomy and recognition from peers and supervisors. The processes include '*Meeting self-*
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52 *determined quality standards to enhance autonomy*'; '*Creating work optimisation tools to*
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54 *increase autonomy and peer recognition*' and '*Revealing informal mastery to gain autonomy*
55
56 *and supervisor recognition*'. Our research challenges existing assumptions that autonomy and
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3 recognition are only to be found in highly skilled roles. We show that workers in low-skilled
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5 roles can draw on their considerable craft skill to improve the quality of products/work
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7 outputs and the efficiency of processes, and to solve unexpected organisational challenges,
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9 earning themselves autonomy and recognition. We also illustrate how workers use time as a
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11 resource to allow them to do anomalous craft by ‘time-hacking’ (i.e. carving out time or use
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13 of lag time to do supplementary work). We add to the craft literature by illustrating that even
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15 in environments where employees are officially designated as ‘deskilled’, they can find
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17 opportunities to retain, practise, and share craft skills. We demonstrate that craft can manifest
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19 in unexpected ways within low-skilled job roles, challenging existing assumptions about the
20
21 nature of craft and its applicability across different types of work.
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29 **The Search for Meaningful Work**

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31 Meaningful work has been identified as ‘the single most valued feature of
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33 employment for the majority of employees’ (Bailey, Madden, Alfes, Shantz & Soane, 2017,
34
35 p. 416) ahead of income, status, and job security (Michaelson et al., 2014). It has traditionally
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37 been linked with highly skilled work, with low-skilled menial jobs, such as mundane
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39 shopfloor work in controlled settings (Burawoy, 1979) and so-called ‘dirty work’ (Ashforth
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41 & Kreiner, 1999) largely assumed to be alienating and meaningless (Yeoman, 2014b). Low-
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43 skilled work is associated ‘with the production of a commoditized self where the individual is
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45 subject to the managerial gaze and work is routinised and controlled [and] alienation is the
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47 outcome’ (Harding, 2019, p. 133). Workers in such roles are frequently controlled, devalued,
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49 and mistreated, experiencing discrimination from those with higher status in the workplace
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51 (Dolan, 2007). Although workers carrying out low-skilled work are the most likely to
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53 experience difficulty in finding meaning in their work, there is scant research focusing on the
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55 dynamics of how such workers might agentially construct opportunities for meaningful work
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3 despite the structural constraints they face (Laaser & Bolton, 2022; Rosso et al., 2010).
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5 Instead, much of the existing meaningful work literature focuses on highly skilled work,
6
7 adopting a psychological lens to examine individuals' subjective cognitive-emotional
8
9 interpretations of work experiences (Rosso, Dekas & Wrzesniewski, 2010). In this paper we
10
11 draw primarily from sociological and philosophical perspectives which centre the alienating
12
13 conditions of modern work and how workers respond agentially to make their working lives
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15 more meaningful (Hodson, 2007; Honneth, 1995; Yeoman 2014a, 2014b; Yeoman, 2019).
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20 Previous research has highlighted two overarching dimensions that are necessary for
21
22 meaningful work but are largely assumed to be absent in low-skilled environments: *autonomy*
23
24 in work and *recognition* by others of their work's value and contribution (Bailey & Madden,
25
26 2017; Dutton et al., 2016; Laaser & Bolton, 2022). Autonomy and recognition are inherent in
27
28 more complex, skilled, or professional work, so work that requires distinct and recognised
29
30 skill is more likely to be meaningful. As Sayer (2009, p. 2) puts it, 'a complex, interesting job
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32 that demands the use of skilled, practical judgement enhances the capacities and satisfaction
33
34 of the worker, whereas a boring, unskilled job dulls the mind. The former is also likely to
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36 bring more recognition than the latter.' Autonomy relates to the worker's status as a decision
37
38 maker: the extent to which they have capacity to control the methods and techniques they use,
39
40 the time needed to complete the work and the order in which it is completed, and the criteria
41
42 upon which it is evaluated (Hodson, 2007; Rosso et al., 2010). Recognition is a more
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44 relational dimension: the 'other-recognized worth acquired from...engaging in work activity'
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46 (Lucas, Manikas, Mattingly, & Crider, 2017, p. 2549). It emphasises the opportunities that
47
48 work provides to gain respect or appreciation from significant others, such as co-workers,
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50 customers, and management (Honneth, 1995; Yeoman, 2014b). Existing research therefore
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52 assumes that workers in low-skilled settings struggle to achieve meaning in their work
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3 because they cannot develop autonomy and recognition in such settings where they are
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5 structurally limited.
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8 While existing research work assumes that autonomy and recognition are largely
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10 absent from low-skilled settings, it has also highlighted that workers do not simply accept
11
12 their alienated position; through ‘purposive, considered, and creative efforts’, they attempt to
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14 make their working lives more bearable by discursively creating alternative meaning systems
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16 or engaging in acts of resistance against the organisation (Hodson, 2007, p. 3; Crowley, 2012;
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18 Pfeffer, 2010). The former involves the worker reframing the significance, value, and
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20 importance of their role. It is an approach particularly common among those doing low-
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22 skilled stigmatised or ‘dirty work’, who reconceive the worth of their labour by connecting it
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24 to wider discourses related to ‘achieving organizational goals and benefiting society in
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26 general’ (Lucas, 2011, p. 362; Ashforth & Kreiner, 1999). Wrzesniewski and Dutton (2001)
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28 show how hospital cleaners view themselves as a vital part of a wider system that helps the
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30 sick and suffering, while Bailey and Madden (2017) illustrate how rubbish collectors employ
31
32 a conservation-oriented discourse to give value to their work. Nevertheless, current work
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34 suggests such workers continue to have little autonomy or recognition in their work roles
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36 (Slutskaya, Simpson, Hughes, Simpson & Uygur, 2016). For example, Mao and Xue (2022,
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38 p. 19) show that adult fast-food workers reframe their work by ascribing ‘moral implications’
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40 to it but they continue to be denied the markers of adulthood i.e. ‘autonomy, self-
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42 determination, and choice’, perceived by younger peers, customers, and supervisors as
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44 inferior for doing ‘a job that is good only for a high schooler’.
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51 Another strand of the literature focuses on resistance through oppositional ‘practices
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53 and relations beyond the gaze of formal management’ (Laaser & Bolton, 2022, p. 381). Such
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55 practices are particularly evident in low-skilled work that is highly routinised, such as on the
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57 industrial shopfloor where labour has ‘been emptied of any significance’ and workers are
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3 subjugated to machines (Vallas, 2001, p. 443; Burawoy, 1979; Hodson, 2007). Workers are
4 treated as human tools; the sequence and pace of their tasks are controlled, conveying ‘that
5 they are not worthy or deserving of making decisions...they are fitted to routine,
6 predetermined activity’ (Breen, 2019, p. 60). While worker resistance is often indirect and
7 covert, it is nevertheless intentional and recognised as resistance by culturally aware
8 observers (Prasad & Prasad, 2001). Workers may ‘misbehave’ through sabotage, removing
9 resources, or using company materials for personal use (Anteby, 2008) in order to ‘take
10 control rather than to be always subject of control’ (Ackroyd, 2012, p. 4). Denied the
11 ‘experience of autonomy’, workers create ‘simulations of autonomy’ by engaging in time-
12 based rituals or games (Yeoman, 2014b, p. 241). Roy (1959) illustrates how machine
13 operators use temporality to punctuate the drudgery of their days and tame ‘the formidable
14 beast of monotony’, creating ‘times’ (e.g. the eponymous banana time) that signal a specific
15 form of social interaction. As Hassard (2002, p. 888) notes, even in the most ‘externally
16 determined task processes’, workgroups can construct their own ‘time-reckoning’ system,
17 ‘playing’ with the construction of time and regulating the amount and intensity of work (Holt
18 & Johnsen, 2019, Burawoy, 1979).

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21 Existing work shows that workers in low-skill environments continually face ‘dramas
22 of dignity’ (Costa, 2022, p. 8) but try to make their work more bearable by reconstruing their
23 roles in a more positive light or by engaging in resistance against the organisation. The
24 assumption is that the structural constraints that fetter such workers mean they cannot achieve
25 the autonomy and recognition that characterise highly skilled or craft roles. We question this
26 assumption and argue that workers in low-skill roles may agentially find opportunities for
27 autonomy and recognition within their work through bottom-up, self-initiated behaviours and
28 informal activities. We ask, *how do workers in low-skilled roles find opportunities to gain
29 autonomy and recognition within their work.* We seek to examine how workers navigate
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3 organisational constraints to gain autonomy and recognition, we turn now to the literature on
4 craft to help us explore the dynamics of how meaningful work might be constructed in low-
5 skilled, controlled environments.
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10 11 12 **Craft and Meaningful Work** 13

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15 Craft can be defined as an ‘timeless approach to work that prioritizes human
16 engagement over machine control’ (Kroezen et al., 2021, p. 5). It relies on human skills—
17 mastery of technique, all-roundedness (a holistic understanding of how different aspects of
18 making interrelate), and embodied expertise—as well as attitudes such as dedication to one’s
19 work independent of expected economic rewards, a concern with communal interests, and an
20 explorative mindset open to experimentation (Kroezen et al., 2021, p. 5). Craft is recognised
21 as an inherently meaningful mode of working (Crawford, 2009), and indeed the origins of the
22 concept of meaningful work are found in writings of the industrial society’s classical
23 theorists. Marx, Durkheim, and Engels all highlighted how dismantling the pre-industrial
24 craft ways of working had stripped work of its inherent meaning (Hodson, 2007; Hodgkiss,
25 2016). For Marx, work should not be an instrumental activity to sustain physical existence
26 but a productive endeavour: ‘an expression and confirmation of our creative power’ realised
27 through the externalisation of skill (Sayers, 2021, p.52; Marx, 1978; Yeoman, 2014b). The
28 shift to industrial capitalism meant that the labour traditionally performed by skilled craft
29 workers was reduced to a series of time-bound, repetitive, and routine tasks closely
30 monitored and controlled by management (Bolton, 2007; Braverman, 1974). Work organised
31 ‘through exploitative and alienating relations’ to increase efficiency and productivity became
32 ‘devoid of intrinsic meaning’ (Simpson, Hughes, Slutskaya, & Balta, 2014, p. 756) and the
33 worker’s ability to exercise autonomy of judgement was eroded, resulting in an alienated self,
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3 unable to ‘proclaim who it is and receive recognition of that proclamation from another’
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6 (Harding, 2019, p. 136. Marx, 1978).
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8 While this binary presentation of craft in polar opposition to industrialisation, a ‘static
9
10 background’ against which the ills of modern work are projected, has been critiqued
11
12 (Adamson, 2013), there remains wide acceptance that the dimensions necessary for
13
14 meaningful work are inherent in traditional craftwork. This is evident in the modern revival
15
16 of craftwork (Crawford, 2009), which asks, ‘what kind of work makes life worth living?’ and
17
18 appeals to the ‘Marxist ideal of un-alienated labour through which workers can exercise the
19
20 full extent of their humanity in a self-determining context’ (Bell, Mangia, Taylor & Toraldo,
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22 2018, p. 10). The craftsman ‘is recognised as having mastery over his skills, independence in
23
24 his way of living...respected for his display of the virtues relevant to his practice’ (Yeoman,
25
26 2014a, p. 69). Much of this literature has focused on craft as a body of knowledge and skill
27
28 used to produce useful objects where considerable time is invested in developing and refining
29
30 technique with often ‘many years required to master the physical skills and mental disciplines
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32 of a first-class practitioner’ (Becker, 1978, p. 854/865). Craft workers are characterised as
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34 skilled workers engaged in ‘creative and meaningful productive activities’, with specific
35
36 technical understanding that relies heavily on their tacit and embodied senses (Bell &
37
38 Vachhani, 2020). They have full control over all facets of the work process and exercise
39
40 judgment over the results. Their overview of the entire work process from conception to
41
42 execution enables them to choose how best to prioritise their time and autonomously decide
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44 when it is completed satisfactorily (Hodson, 2007, p. 264; Sennett, 2008). Therefore, time
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46 plays a crucial role in both the development of craft skill and the production of craft objects.
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53 While a substantial proportion of the craft literature has focused on the understanding
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55 of craft as a highly skilled ‘traditional’ approach to work (Crawford, 2009), craft has also
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57 been presented as a type of ‘work orientation’—an internalised evaluation in which
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3 individuals make sense of their work as something worth doing (Pratt, Pradies & Lepisto,
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5 2013, p.175). It thus differs fundamentally from a ‘dispassionate and utilitarian involvement
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7 with one’s work’ (Kroezen et al., 2021, p. 507). Defining craft as ‘an enduring, basic human
8
9 impulse, the desire to do a job well for its own sake’, Sennett (2008, p.9) argues that workers
10
11 can approach their work with a sense of craft and commitment to the pursuit of quality. Here,
12
13 craftsmanship does not denote a specific type of work but rather any work motivated by the
14
15 desire to do a job to the best of one’s ability (Simpson et al., 2014). While craft is usually
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17 only linked with low-skilled work to act as a point of comparison, Tweedie and Holley
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19 (2016) draw on Sennett (2008) to illustrate how cleaners used a craft discourse to reframe the
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21 meaning of their work, taking care and pride in their activities despite being engaged in what
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23 is usually considered low value work. Despite their best efforts, they remained devalued, and
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25 the recognition they sought for their work from others was routinely denied (Costa, 2023).
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31 While some work has focused on how workers can approach their jobs with a ‘sense’
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33 of craft, research in the craft domain generally assumes that craft is synonymous with skilled
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35 labour and artisanal work, and antithetical to low-skilled work (Bell & Vachhani, 2020). We
36
37 challenge this assumption and argue that workers carrying out work characterised as low
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39 skilled in controlled settings may have significant latent craft skill and can find ways to
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41 navigate structural organisational constraints and leverage their skills to make their work
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43 more meaningful. We present a case based on an eight-month ethnographic study of a mould-
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45 producing company in France where workers are engaged in highly typical factory work. We
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47 identify three processes through which workers manage to find temporal opportunities to
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49 engage in what we term ‘*anomalous craft*’ - the agential implementation of latent craft skills
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51 and attitudes within the formal work process in low-skill controlled settings. They can thus
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53 work more autonomously and earn recognition from their peers and supervisors, making their
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55 work more meaningful.
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Methods

Access and Research Setting

The setting for our study is Formco¹, a firm of just over seventy employees based in France. Formco produces moulds (mostly in aluminium or steel but also in polystyrene, resin, or wood) for several industries, including packaged goods, automotive, medical, and sports. The firm was established a century ago and is one of the few French-based thermoforming mould creation companies to survive intense competition from countries with lower labour costs. We decided to focus on Formco because our initial interest was in innovation and Formco's CEO identified the company as highly innovative and offered us strong access opportunities.

The production of the moulds is highly standardised, with written procedures that outline a series of precise steps: designing, programming, machining, and fitting. In the first step, a designer uses a computer program to create a 3-D image of a mould based on the customer's product specifications. A programmer uses that image to develop a program for the operating machines, creating a 'toolsheet' that outlines the machine and specific tools to be used, and the order in which the tools should be used. The shopfloor workers (operators and fitters) then produce the mould.

Shopfloor workers

Although all four groups of workers are subject to some degree of standardisation in their work, our focus is on the 44 shopfloor workers, made up of 16 operators (1 woman and 15 men) and 28 fitters (all men). They carry out routinised low-skilled work via a series of pre-set tasks that follow objective measures of quality (based on ISO Standards). They are monitored using a swipe-card system which registers when they begin a new task (installing the mould, starting the machining, sanding the mould, etc.). They have strict working hours

¹ The names of the organisation and its employees are pseudonyms.

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3 and specified break times, and they work largely alone on the machines (operators) or at
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5 workbenches (fitters).
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8 Operators are responsible for operating the computer numerical control (CNC)
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10 machines that make the moulds. Their main tasks are to position the raw materials (e.g.
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12 aluminium block) in the machine and follow the programmers' instructions for hanging the
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14 appropriate tools inside the machine, positioning the machine, and uploading the program.
15
16 Before beginning the machining, the operator must sign each line of the toolsheet to confirm
17
18 they have checked each tool and positioned it correctly. The time needed to machine one full
19
20 mould can vary from two hours to several days, depending on how often the mould has to be
21
22 repositioned as indicated on the toolsheet. The operator is not permitted to alter or change the
23
24 program or modify any parameters (e.g. type of tool used). While the machine is running, the
25
26 operator must stay beside it to ensure that the process runs as expected. After the machining
27
28 process is complete, the operator signs the designer's image to confirm that the mould has the
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30 indicated dimensions.
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35 Fitters complete the mould by making any final changes to ensure it conforms to the
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37 designer's initial drawing. These changes are those that cannot be made by the CNC machine,
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39 such as creating certain types of holes, adding screws, and sanding and buffing the mould to
40
41 the required finish (e.g. highly polished, matte, or granular). Once they have finished, they
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43 have to confirm that the mould is of the required quality by signing a series of 'control
44
45 points' on a control sheet (e.g. 'Confirm that the numbers of screws added are the same as
46
47 numbers indicated on designer's drawing' and 'Confirm that the sanding finish is the same as
48
49 the one indicated on designer's drawing').
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56 ***Data Collection and Analysis***

57 *Interviews*

1
2
3 In order to get insights from a diverse sample of participants with different roles
4 (Patton, 2002), the first author initially conducted 28 exploratory interviews with employees
5 who worked in the production site where the moulds were produced (19 interviews),
6 individuals in the administrative/management office, and some important external
7 stakeholders (9 interviews) (see Table 1 for details of interviewees). The interviews lasted
8 between 45 minutes and 3 hours and were all recorded and transcribed. Each interview began
9 with a broad question, ‘Can you tell me about your role here at/involvement with Formco?’
10 Subsequent questions were derived from the dialogue, with follow-up questions prompting
11 the interviewees to elaborate further. Our initial interest was on innovation but it became
12 clear as the interviews progressed that Formco was in fact a highly typical manufacturing
13 firm. We were, however, intrigued to observe that although the work of the fitters and
14 operators was identified by themselves and others as mundane, controlled, and repetitive,
15 they also took pride in it and attached great importance to producing quality products.

32 *Interviews Analysis*

33
34
35 The first author began to systematically code both sets of interviews, taking a
36 grounded, inductive approach (Charmaz, 2008; Strauss & Corbin, 1997). From this early
37 coding she developed more than 200 codes. The first and second authors then sought to
38 reduce the codes into larger categories. They worked collectively to group together similar
39 codes and relabelling the group to reflect the expanded category, continuing until they
40 reached 17 distinct categories. In trying to make sense of how these categories were related,
41 an interesting dichotomy between two clear clusters of categories came to light. One cluster
42 reflected the negative attitudes and experiences of shopfloor workers, and the other related to
43 more positive experiences (see Table 1). There was insufficient data to understand when and
44 how workers approached and understood their work in such different ways and it was decided
45 to conduct a longer-term ethnographic study.

Ethnographic Study

The first author carried out an ethnographic study that lasted eight months, during which two to four days each week were spent at Formco. She observed workers in their daily roles, created detailed field notes with comprehensive accounts and descriptions of daily events, and conducted ongoing interviews in the form of conversations with workers (Barley & Kunda, 2006; Van Maanen, 2011). Prior to starting the ethnography, a meeting was organised with the employee delegate to explain the study and emphasise that all data would be anonymised and confidential, and that workers could refuse to take part or withdraw from the study at any point. A notice stating this was displayed on the shopfloor and the researcher reiterated this each time she interacted with a new individual. She examined internal and external documents relating to the organisation to understand the history of the firm, its organisational structure and governance, the client base, the technology used, and products produced.

During the ethnographic study period, she shadowed each of the 72 workers at least once (only one employee refused to be observed). To fully understand the mould production process and the division of labour across various employee roles, she spent the first two months moving from one work area to another, following the order of the production process (i.e. sales, designers, programmers, operators, and fitters and their respective managers). She spent the third month of the ethnography on the shopfloor, observing interesting activities and events rather than specific individuals or groups. The final five months of the ethnography were predominantly spent observing and shadowing the shopfloor workers. She also informally interacted with the employees during breaks and lunchtime. While initially treated with some level of distance as an ‘interloper’ (Anteby, 2024) by shopfloor workers, the first author worked hard to build trust with her predominantly male participants. She wore their blue-collar uniform, did menial tasks like cleaning the floor at the end of the day, and assisted

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2
3 with simple but dirty tasks that often left her covered in debris. She also ‘proved’ herself by
4 shadowing them for the entirety of the night shift, which is recognised as being difficult and
5 exhausting for those unaccustomed to it. After each day of observation, she typed up her
6 written field notes and wrote memos about important themes and questions that had emerged
7 over the day. She also photographed the offices and workstations, and videoed various
8 manufacturing processes as an aide memoire. In total over 300 pages of ethnographic field
9 notes were collected.

19 *Analysis of Ethnographic Field Notes*

21 We began the analysis of the field notes mindful of the paradoxical positive and
22 negative attitudes and experiences of shopfloor workers; the aim was to understand when and
23 how workers approached and understood their work in such different ways. The field notes
24 reflect numerous instances of shopfloor workers talking negatively to the researcher and each
25 other about their work. Almost every shopfloor worker complained about pay, the coercive
26 and controlled working conditions, and their dislike of senior management. There were also
27 examples of worker resistance. During the night shift, workers were authorised to take one
28 break but if no supervisor was present, they often took three or four. Sometimes they left the
29 shopfloor without swiping out, leaving the machine to run unsupervised. There were
30 instances of ‘working to rule’ when workers did the bare minimum or slowed down if
31 beneficial for pay. A small number of workers were observed stealing materials for their own
32 use or creating ‘homers’ using workplace materials (Anteby, 2008). Overall, however, we did
33 not find evidence of large scale or systematic resistance.

35 What we did find were many instances of workers appearing to enjoy their roles,
36 being engaged in their work, and taking pride in producing quality work. We searched the
37 fieldnotes to see if there was a pattern to these incidents and observed that they occurred
38 when workers had the opportunity to do additional tasks that were not part of their routinised
39

1
2
3 work. We noticed that these tasks enabled workers to use latent craft skills that were
4
5 underutilised in the normal production process. We started comparing and contrasting these
6
7 examples of craft activities, returning to the literature to try to make sense of them. We
8
9 worked iteratively in a ‘recursive, process-oriented, analytic’ manner (Locke, 1996, p. 240),
10
11 moving between the data, the craft literature, and other literatures related to workers in low-
12
13 skill jobs, including labour process theory and dirty work. What began to emerge was that
14
15 when workers engaged in craft activities, they could gain more autonomy in their work (i.e.
16
17 they could control how they did it and judge when it was done satisfactorily) and that
18
19 sometimes the value of their work was recognised by others. A return to the literature
20
21 established that autonomy and recognition are two key dimensions of meaningful work that
22
23 are often considered missing from low-skilled work. There was also very little in the craft
24
25 literature relating to low-skilled work. Therefore, our emerging findings were somewhat
26
27 surprising and extant research could not fully account for them (Sonenshein, 2014).
28
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33 In order to theorise from our data, we returned to our examples to better understand
34
35 how workers were finding opportunities to engage in craftwork in the controlled
36
37 environment, the various craft activities in which workers engaged, and how craftwork led to
38
39 autonomy and/or recognition. We noticed that these craft activities were driven by workers’
40
41 own agency, and that opportunities to engage in craft were enabled by ‘time-hacking’, a term
42
43 we use to describe the carving out of additional time or use of lag time to do supplementary
44
45 work. Workers ‘time-hacked’ by using time gained by being ahead of their given work tasks
46
47 or using their time in ways that differed from their prescribed schedule when less supervised
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49 during nightshifts; working through personal break times; advocating for time from
50
51 supervisors; and using time that was made available by production stoppages. We then
52
53 analysed the various craft activities and classified the examples into clusters, creating three
54
55 wider groups that drew on different craft skills and attitudes: ‘meeting self-defined quality
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3 *standards* ‘*creating work optimisation tools*’ and ‘*revealing informal mastery*’. We call the
4
5 craftwork we identified in this low-skill setting ‘*anomalous craft*’ since these instances of
6
7 craft deviated from the standardised or normal work processes and should not, according to
8
9 the planning processes, have been allowed to occur. We noticed that each cluster of craft
10
11 activities related to different aspects of the work (the mould; the tools used to produce the
12
13 moulds; or the wider production process) and had different outcomes in terms of autonomy,
14
15 peer, and supervisor recognition. We therefore show three different but interrelated processes
16
17 where anomalous craft leads to meaningful work. The entire data collection and analysis
18
19 process is summarised in Table 1.
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24 -----
25 INSERT TABLE 1
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27

28
29 The first process ‘*Meeting self-determined quality standards to enhance autonomy*’
30
31 occurred when workers perceived a need to further improve the mould, found time to carry
32
33 out additional work, determined the order of tasks and their duration, deciding when the work
34
35 was satisfactorily completed; they thus enhanced their autonomy. The second process,
36
37 ‘*Creating work optimisation tools to increase autonomy and peer recognition*’, occurred
38
39 when workers decided that the tools for creating the moulds could be improved in some way
40
41 and found time to carry out this work, engaging in more complex, non-routinised tasks and
42
43 their creations were often shared with other workers; they thus increased autonomy and
44
45 received peer recognition for their creations. In the third process, ‘*Revealing informal*
46
47 *mastery to gain autonomy and supervisor recognition*’, we show how when wider production
48
49 challenges caused time lags in the production process, workers had the opportunity to engage
50
51 in craft, helping supervisors solve problems both within and outside of their own domain of
52
53 tasks; they thus gained more autonomy and supervisor recognition. Across these three
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3 processes, workers used their latent craft skills and attitudes to both identify craft issues and
4
5 engage in craft work.
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10 Findings

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12 The shopfloor workers carry out what is classified as low skill, routinised work and
13
14 the level of standardisation and automation is such that they should simply follow each step
15
16 in the outlined procedures without any possibility of deviation. We identify three processes
17
18 through which workers find opportunities to move away from their routinised tasks, ‘time-
19
20 hacking’ (carving out time or use of lag time) to engage in ‘anomalous craft’ i.e. the agential
21
22 implementation of latent craft skills and attitudes within the formal work process in low-skill
23
24 controlled settings, gaining more autonomy and receiving recognition. We outline the three
25
26 processes below, and further details of which are provided in Table 2. This table also offers
27
28 supplementary examples of the processes, illustrating how workers identify opportunities for
29
30 non-routine work, engage in time-hacking to find time to do that work, the craft activities
31
32 they carry out, the related craft skills and attitudes, and the outcomes in terms of autonomy
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34 and recognition.
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41 INSERT TABLE 2 AROUND HERE
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44

45 Meeting self-determined quality standards to enhance autonomy

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47 The first identified process occurred when workers perceived the need for (usually cosmetic)
48
49 improvements in a mould that already met the required external standard. Like craft workers,
50
51 they took ‘pride’ in their work, ‘insisting on quality work, regardless of the pressures toward
52
53 volume production’ (Hodson, 2007, p. 141; Sennett, 2008). Through time-hacking, they
54
55 found time to meet their self-determined standards, judging for themselves when the work
56
57 was satisfactorily completed. The opportunity to do quality-oriented craftwork is therefore
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2
3 created by workers by approaching their work with a craft attitude of ‘dedication’ where they
4 seek to achieve a quality end product ‘independent of expected economic rewards’, agentially
5 deciding that the current standard of the product or output is suboptimal and requires
6 additional work (Kroezen et al, 2021, p. 72; Bell & Vachhani, 2020; Sennett, 2008). Workers
7 made that judgment by relying on their latent craft skill based on tacit and embodied ways of
8 knowing (Ewenstein & Whyte, 2007). The outcome of this process is that during these
9 periods of craftwork, workers gain more autonomy because they can determine the tasks and
10 their duration, organise their own work, and decide when it is satisfactorily completed; they
11 can thus engage in more meaningful work.
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24 ***Becoming the decision maker.*** Mickael (Example 3, Table 2) is a fitter whose main
25 task is to fix nozzles (cylinders of one cm³ with several small holes to allow the air to escape
26 the mould during the production process) by hammering them into pre-existing holes in the
27 mould. Workers who perform this fastidious and repetitive task are unofficially called
28 ‘nozzlers’. On this particular day, Mickael had to insert more than three hundred nozzles into
29 an aluminium sheet within a set period of time. After he had inserted approximately one
30 hundred nozzles, he examined the mould, saying aloud, ‘My mould doesn’t look right; some
31 nozzles are too long and don’t sit at the right height’. The researcher was unable to see the
32 problem and asked, ‘Does it matter for the mould or the customer?’ Mickael answered, ‘This
33 mould is only for producing an isothermal box, so it wouldn’t bother the customer’. Time-
34 hacking, Mickael glanced at the clock, saw that he was ahead of schedule, and decided to use
35 that time to sand and polish each incorrect nozzle until he was fully satisfied with the overall
36 appearance of the mould. After 30 minutes of this, he said, ‘Now it looks much better; look,
37 all the nozzles are at the same level’. Although the mould had already reached a standard
38 sufficient for the needs of the customer, by identifying concerns related to the appearance of
39 the mould and finding additional time Mickael was able to engage in craftwork focused on
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3 improving the quality of the mould. This allowed Mickael more autonomy enabling him to
4
5 decide how to achieve his own quality standards. On other occasions when worker's had
6
7 insufficient time to work to their own quality standard within official production times, they
8
9 were observed to use time during their breaks to complete a mould to their satisfaction (see
10
11 Example 1, Table 2).
12
13

14
15 In another example, during a night shift when there was no supervisor, David
16
17 (Example 2, Table 2) an operator, did not immediately begin the process of installing the
18
19 aluminium block inside the machine as he was supposed to. Instead, he looked inside the
20
21 machine, examining the panels (shaped like the bellows of an accordion) and drew on his
22
23 embodied skill to judge the accumulation of dirt on each one by touching it to assess the
24
25 thickness of grime. He then unilaterally decided that rather than dealing with the set work, he
26
27 would use his time differently, deciding to clean his machine, doing so until it reached a level
28
29 of cleanliness that he believed would no longer impact negatively on the quality of the mould.
30
31 This process took more than two hours out of a six-hour shift. When asked why he had risked
32
33 incurring his manager's wrath by spending such a large proportion of his time cleaning the
34
35 machine, he answered, 'It is completely filthy; I cannot work like that. If the machine is dirty,
36
37 it will affect the mould and the mould won't look right'. David therefore time-hacked by
38
39 deciding how to allocate his time, working autonomously, and relying on his own judgment
40
41 as to when the machine was fit for work.
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48 We see in these examples how, by engaging in quality-driven craftwork, workers
49
50 made decisions about the organisation and execution of their work. They determined the steps
51
52 and methods necessary for meeting their own quality standards, and judged when these were
53
54 met, thus acquiring more autonomy in their work.
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56
57 *Securing supervisor support to set standards.* Sometimes, workers may need to
58
59 advocate to supervisors to convince them that worker-determined quality standards are
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3 necessary. Christophe, an experienced fitter (Example 4, Table 2), was polishing a huge
4
5 mould to remove small defects that were by-products of the machining process. His
6
7 supervisor Paul, believing this to be unnecessary and wanting to move Christophe onto his
8
9 next allocated task, asked Stephanie, a commercial team member, for advice since she would
10
11 complete the last check before sending the mould to the customer. Stephanie looked at the
12
13 mould, turning it round to examine each of the marks pointed out by Christophe. She stopped
14
15 at one mark and said, 'Yes for this one, and [pointing to another small flaw] maybe this one'.
16
17 Christophe responded, 'OK, I will polish everything.' Stephanie answered, 'There is no point
18
19 polishing everywhere, it's only cosmetic. If we do this, how much time will we spend doing
20
21 solely cosmetic work?' Christophe, unhappy with this response, argued, 'But if we don't
22
23 polish it all, it will simply be a patch-up job'. Stephanie looked again at the mould, touching
24
25 the different marks. She then concluded: 'OK, fine, polish it wherever you want', adding,
26
27 'Personally, I would start with the sander and then with the scraper'. By raising concerns
28
29 about the mould's appearance and convincing his superiors this was important, Christophe
30
31 secured extra time for quality-oriented craftwork. While Stephanie gave Christophe advice on
32
33 how to do the work, she left it to his discretion how he carried it out. Christophe gained more
34
35 autonomy because he had permission and time to carry out his work as he saw fit, and he
36
37 could decide for himself when the quality of the output was sufficient.
38
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44 ***Informal apprenticing.*** Workers could also find opportunities to work collectively to
45
46 do quality-oriented craftwork. Thierry, a young fitter (Example 5, Table 2), was tasked with
47
48 repolishing part of a mould that a customer had sent back because its surface had become
49
50 uneven and needed re-sanding. Thierry noticed that the small aluminium sheet that indicates
51
52 the mould's serial number had come loose. He remarked to the researcher, 'Oh it's weird, it's
53
54 not screwed'. Although the control sheet did not state that this aspect of the mould should be
55
56 modified, Thierry sensed that it would not meet the quality standard expected by the other
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3 fitters and went to consult Pascal, a more experienced fitter who worked close by. Pascal
4 explained that the aluminium sheet had most likely been glued on because the two holes in
5 the aluminium sheet were not aligned with the two holes in the mould, making it impossible
6 to affix the sheet with screws. The only solution was to weld the sheet's existing holes and
7 create new ones that aligned with the mould's holes. Pascal explained the welding process to
8 Thierry since this task fell outside Thierry's assigned tasks:
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17 P: 'You would need to clean the mould with the air blower and then weld it, start the
18 welding machine on a really high [amperage] setting'
19

20
21 T: '100?'

22
23 P: 'No, at least 200.'

24
25
26 Since Thierry's task was to sand not to weld, he needed permission and time from the
27 supervisor (Pierre) to carry out this extra task. Pierre told Thierry to consult Guillaume, the
28 sales manager, to determine precisely what the customer had paid for. Thierry explained the
29 issue to Guillaume who confirmed that the customer had not paid for this but nevertheless
30 agreed that Thierry could fix it. Thierry had time-hacked securing the time needed to do the
31 additional work and went back to his work bench and began to weld. After a few minutes, he
32 looked at the aluminium sheet, which had become curved and misshapen, and said, 'It's gone
33 weird'. He returned to Pascal for advice. Pascal told him kindly that he needed to sand it, first
34 with the rolling mill and then manually, and it would be fine. Thierry followed Pascal's
35 instructions and after a few minutes said, 'Well, I think that's enough.' He went to show
36 Pascal, who smilingly confirmed, 'Ah, it's fine now...no one will see [the error]'. Here,
37 Thierry identified a quality issue and was able, with Pascal's support, and time from his
38 supervisor to work more autonomously on a non-scheduled work task, creating a finished
39 mould that aligned with the quality standards of the more experienced fitters.
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Creating work optimisation tools to increase autonomy and peer recognition

The second identified process occurred when workers realised that standardised tools and practices could be optimised or improved in some way. The opportunity to do this tool-optimisation craftwork was created by the worker agentially deciding that the process of creating the moulds could be improved, and then finding time for the extra work through time-hacking. Workers searched for solutions that would optimise their work processes by drawing on a craft mindset of exploration ('openness to experimentation, improvisation and real-time variation, supporting by experiential learning'; Kroezen et al., 2021, p.5) to create tools. They also drew on their 'all-roundedness' or the holistic understanding of how different aspects of the process interrelate (Becker, 1978; Sennet, 2008, Kroezen et al., 2021). Creating work optimisation tools allowed workers to achieve more autonomy in their work by tackling more complex integrated tasks that involved both design and execution (Sennett, 2008). The tools, once developed, were often used, and admired by other workers, who gave the creator due recognition. This autonomy and recognition provided workers with the conditions necessary for more meaningful work. See examples of several tools created by workers in Table 3.

INSERT TABLE 3 AROUND HERE

Integrating design into their work. As fitters are the last step in the production process, they sometimes have to wait for a CNC machine to finish a mould if the planned machining runs over schedule. During this time, they have no official work but they are still expected to wait alone at their workbench for the moulds to be ready. We noticed that many of the fitters filled this time by creating hand-made tools that increased the efficiency of their work or decreased the risk of work-related injury, thereby improving the work process.

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3 Individuals keep these tools at their workbenches, and the more useful or creative tools are
4
5 borrowed by other shopfloor workers.
6

7
8 Jean-Pierre (Example 8, Table 2), a fitter working on the manual milling machine, had
9
10 been allocated a large number of moulds to mill in a set period of time. Before milling a
11
12 mould, workers need to verify that the right and left sides of the mould are aligned with the
13
14 horizontal axis of the machine. Jean-Pierre surveyed the piled-up moulds, saying, ‘I would be
15
16 much more efficient if I had a tool that automatically aligned the right and the left side.’
17
18 Time-hacking, he decided to use his time differently than allocated and to spend time creating
19
20 a tool that would increase his efficiency. Through trial-and-error, he fashioned a tool that
21
22 looked like a metal sheet shaped in a U. This, he affixed to the horizontal axis of the machine
23
24 table, and thereby ensured correct alignment of the mould every time. Engaging in this
25
26 craftwork had taken time but since the new tool had made him more efficient, he completed
27
28 his allocated work on schedule. Through this process, Jean-Pierre was able to undertake more
29
30 complex tasks and work autonomously to design and create a new tool. Creation of the tool
31
32 also afforded him the opportunity to be recognised by other workers as highly skilled. Remi,
33
34 an operator, noted that ‘Jean-Pierre is so smart, all his moulds are always correct, he knows
35
36 everything.’ This tool was one of several that Jean-Pierre had created and kept in his
37
38 cupboard. Other operators often sought his permission to use his tools to enhance the quality
39
40 of their own moulds or work processes. See also Jeremy’s tool for fashioning circular shapes
41
42 on the milling machine (Example 6, Table 2 and Picture 4, Table 3), something that was
43
44 previously only possible on the lathe machine.
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51 ***Collaborating with peers to design new tools.*** Nicolas, a fitter, (Example 9, Table 2),
52
53 was working on a particular mould when his supervisor, Charles, and the plant manager came
54
55 to him to explain that the customer now wanted the mould to have a flat-bottomed
56
57 indentation approximately 40 mm in diameter. He added that Nicolas should use the manual
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3 milling machine because it would take too long to reprogram the CNC machine. Nicolas
4
5 searched the storage area for an appropriate tool, but none would create a flat indentation. He
6
7 eventually found a tool that could potentially work (a type of rod with a blade at the bottom)
8
9 but judged that it wouldn't fit neatly in the milling machine and might create a bump on the
10
11 indentation if it moved during the machining process. Nicolas explained the issue to Charles,
12
13 and suggested he go to talk to Sandrine (the CNC lathe machine operator) who might be able
14
15 to help. Nicholas given the go-ahead from Charles to find a solution now had some time to
16
17 explore potential options and headed off to speak to Sandrine. Sandrine explained that she
18
19 didn't have the right tool but told Nicolas she could create one. She took a piece of paper and
20
21 began to draw the tool following Nicolas's instructions in terms of shape, asking him what
22
23 length the rod should be and where the blade should be positioned. Nicolas showed Sandrine
24
25 the tool he had found in the tool storage area, saying they could copy the length of this one
26
27 but needed to change the diameter. Sandrine said, 'OK, so 57[mm] here and 9[mm] there,
28
29 that should work?', showing two different areas on the drawing to Nicolas, who agreed. Once
30
31 they had the dimensions, Sandrine said, 'I can't do it right now as I have something else to
32
33 finish but you will have it after lunch, I'll bring it to you.' Sandrine spent part of her lunch
34
35 break making the tool (Table 3, Picture 10). When she took it to Nicolas's workbench he
36
37 thanked her, telling her it was exactly what he needed. She replied, 'No worries, I loved
38
39 doing it'. To the researcher, she remarked, 'I love doing challenging things at work where I
40
41 have to figure things out'.
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49 In this example, Nicolas realised that the existing tools were suboptimal and was
50
51 allowed by his supervisor to take time to find alternative solutions. Whereas initiated by
52
53 Nicolas, Sandrine also had the opportunity to break away from her routinised work and
54
55 engage in an explorative activity that helped Nicolas devise a more effective tool. Sandrine
56
57 also time-hacked by using additional time during her break to complete the tool. The
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3 exchange between Sandrine and Nicolas became an opportunity to work together on a more
4
5 interesting task, in which they could conceive and design how the new tool should look and
6
7 function. Through this collaboration, Nicolas and Sandrine engaged in more autonomous
8
9 work that was not part of the scripted organisational process. Sandrine also received
10
11 recognition from Nicolas, who expressed gratitude for her efforts. He emphasised that it
12
13 precisely met his needs, acknowledging Sandrine's expertise in tool development.
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19 **Revealing informal mastery to gain autonomy and supervisor recognition**

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21 The third process occurred when an unexpected organisational challenge disrupted or
22
23 halted the routinised work processes causing work to slow down or grind to a halt and
24
25 workers agentially decided to involve themselves in solving these complex problems. They
26
27 thus time-hacked by turned a work lag into an opportunity to escape their routinised work,
28
29 revealing their informal mastery by utilising craft skills to address challenges both within and
30
31 beyond their formal job tasks. Informal mastery is a form of craftwork associated with the
32
33 exceptional skill or competence of certain individuals that was not formalised (i.e. they had
34
35 no formal qualification or status) and draws on experimentation, exploration, and all-
36
37 roundedness (Kroezen et al, 2021). Revealing informal mastery not only grants workers
38
39 autonomy in their tasks but also garners recognition from their supervisors, as they propose
40
41 novel solutions that are often better than those initially suggested by their supervisors or solve
42
43 issues supervisors cannot.
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49 ***Demonstrating job expertise superior to supervisors.*** When problems occurred that
50
51 created production blockages or caused work to stop, workers often used the opportunity to
52
53 illustrate their craft skills, offering solutions that demonstrated an in-depth knowledge and
54
55 expertise often superior to that of their supervisors. For example, Olivier (Example 11, Table
56
57 2), a fitter, was trying to push an insert into a mould. The insert should, according to the
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3 designer's drawing, overhang each side of the mould, but the hole for it was too small,
4
5 meaning that the mould had to be re-machined. Until this step was completed, the production
6
7 process would be put on hold. Olivier alerted Theo, the plant production manager, to the
8
9 problem. Theo, annoyed at being interrupted, demanded, 'Where is the drawing?' Olivier
10
11 handed it to him. Theo looked at the drawing and told Olivier they would need to reprogram
12
13 the CNC machine because the mould had to be resurfaced on the sides where the insert would
14
15 sit so it could hang over the edges. Olivier examined the mould thoughtfully, then suggested,
16
17 'But we could also do it on the manual milling machine, don't you think that would be faster
18
19 since we wouldn't have to reprogram everything?' Theo considered the idea, and said, 'Yes,
20
21 you're right it would be faster, but we don't have the right milling cutter to do it?' Olivier
22
23 responded, 'But that's not a problem. Rémi [the milling machine operator] could use a
24
25 smaller cutter and instead of cutting straight down, he can gradually lower the cutter and
26
27 move it from right to left to make the hole bigger'. Theo nodded enthusiastically, 'Yes, good
28
29 idea. Can I let you handle it and explain it to Rémi?'

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35 In this example, Oliver suggested a more efficient and easier solution than the one
36
37 suggested by his supervisor, who acknowledged the superiority of Oliver's idea. Not only did
38
39 Theo recognise Oliver's expertise, he also gave him permission to step away from his
40
41 workstation and use the lag time to solve the issue by assigning and directing the work of
42
43 another fitter. Although there are no official distinctions in skill level or pay among fitters,
44
45 Theo had informally acknowledged that Olivier possessed the skills and ability to oversee
46
47 and explain tasks to his peers.

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51 In another example (Example 10, Table 2), Theo asked Jean-Pierre to individually
52
53 drill holes into dozens of identical moulds. This would normally have been done quickly on
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55 the CNC machine with one program, but all the CNC machines were occupied creating a
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57 production blockage, so Theo decided the best solution would be for Jean-Pierre to manually
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3 create the holes. Jean-Pierre picked up a mould, examined it, and suggested that ‘it would be
4 more efficient to smooth the surface of each mould before drilling the holes.’ Theo quickly
5 responded, ‘That’s unnecessary, the customer isn’t bothered about what the finish of the
6 moulds is like’. Jean-Pierre placed the mould onto the machine and argued, ‘But if we
7 smooth the surface of each mould, we could make all the holes all at once on the milling
8 machine, which would save time.’ As he spoke, Jean-Pierre mimicked how positioning the
9 moulds on the machine and smoothing their surfaces would optimise the process. Theo
10 nodded, ‘Oh, I see now. Yes, you are right that will be much faster.’ He added, ‘Alright, let’s
11 do that, smooth the surface first, then drill the holes.’ Although Theo had initially dismissed
12 Jean-Pierre’s idea, the demonstration of how it could work convinced him otherwise. Jean-
13 Pierre’s idea was acknowledged to be better than his own, and Jean-Pierre was left to use his
14 time how he saw fit carrying out the task in his preferred manner rather than having to follow
15 the more monotonous procedure suggested by the plant manager.

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33 ***Solving problems using expertise beyond their formal work tasks.*** Workers could
34 also become involved in work that was unrelated to their own tasks if they came up with
35 solutions for production challenges or blockages. In Example 12, Table 2, Adil, the
36 operators’ supervisor, was with Guy, the programmers’ supervisor, trying to reassemble a
37 machine they had dismantled for repair. They needed to put the hood back on the machine,
38 but it was too heavy to move. Laurent, an operator, was watching them as he launched a new
39 mould on his CNC machine. He came over to them with ‘an idea.’ He explained that they
40 could create an elevator system made up of several wedges, threaded rods, and a crowbar.
41 The supervisors did as Laurent suggested and managed to lift the hood to the required level,
42 but they could not put it in the right place; something was blocking it. They tried to push it
43 and then pull it, but nothing happened. Laurent intervened, ‘I think I know what the problem
44 is.’ He walked inside the machine, looked carefully, and told them ‘It is full of aluminium
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3 chips, and this is what is stopping it.’ Before returning to his machine, he enquired with
4
5 gentle sarcasm, ‘Can I leave you two to fend for yourselves now?’ In this example, Laurent
6
7 time-hacked by seizing the temporal opportunity presented by a machine breakdown to halt
8
9 his routinised work and reveal his skill by successfully addressing two challenges that were
10
11 beyond Guy and Adil. As such, Laurent not only had an opportunity to stop his routinised
12
13 work, he also gained recognition from supervisors who had solved their problems following
14
15 his advice, thus implicitly acknowledging his experience. Another day, Guy was walking
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17 through the plant and saw Laurent doing unauthorised manual bricolage. He was using 3-axis
18
19 machine to manually machine a base for a mould in order to simplify subsequent machining
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21 on a 5-axis machine which was not normally allowed. Guy acted as if he hadn’t seen this,
22
23 saying to the researcher, ‘He is the only one who can do that, I let him do it [even through its
24
25 normally forbidden]’. Workers could therefore sometimes gain informal privileges that
26
27 allowed them to do more autonomous craftwork. See also Example 13, Table 2, in which
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29 Arthur became involved with solving a problem unrelated to his own work tasks, using his
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31 expertise in working with polystyrene to help another co-worker and his supervisor find a
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33 solution to a production problem.
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40 **Meaningful work through anomalous craft: Three interrelated processes**

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42 *Anomalous craft* is the agential implementation of latent craft skills and attitudes within the
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44 formal work process in low-skill controlled settings. We identify three interrelated processes
45
46 through which anomalous craft can enable workers to enhance their autonomy and receive
47
48 recognition leading to more meaningful work. These three processes and their impact on
49
50 workers’ autonomy and recognition (i.e. meaningful work) are depicted in our theoretical
51
52 model of ‘Meaningful work through anomalous craft’ (see Figure 1 below).
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57 INSERT FIGURE 1 AROUND HERE
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3 In the first work process (*Meeting self-determined quality standards to enhance*
4 *autonomy*) the focus of improvement is the product or output (i.e. the mould). Although the
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6 actual tasks (e.g. polishing, machining, welding) do not fundamentally change, workers
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8 navigate constraints in the system to gain additional time (i.e. time hack) that provide
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10 opportunities to make decisions, secure supervisor support, and engage in informal
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12 apprenticeship, thus making their work more autonomous.
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17 In the second process (*Creating work optimisation tools to increase autonomy and*
18 *peer recognition*), the focus shifts to the tools or systems used to create the output. Workers
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20 identify aspects of the work systems or tools as suboptimal and engage in craftwork, and
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22 carry out more complex, non-routinised tasks to create new tools that optimise the existing
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24 ways of working. Through time-hacking, they can work independently and sometimes
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26 collectively on their creation. Engaging in this process increases workers' autonomy and peer
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28 recognition.
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33 Lastly, in the third work process (*Revealing informal mastery to gain autonomy and*
34 *supervisor recognition*) the focus is on solving complex unexpected organisational challenges
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36 both within and outside their work domain using their informally gathered expertise. They
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38 use time that becomes available when the normal routinised work is disrupted. Engaging in
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40 this process earns workers autonomy and recognition from supervisors.
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45 Frequent engagement in *anomalous craft* reinforces workers' ability to determine
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47 when additional work is needed as they become more skilled. The more workers engage in
48
49 anomalous craft the more they are recognised as having craft skill by their supervisors,
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51 allowing them further agency to identify suboptimal ways of working or to intervene to solve
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53 organisational challenges. Supervisors may even request workers to engage in anomalous
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55 craft to help solve organisational challenges if they have previously demonstrated their
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57 informal mastery.
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DISCUSSION

In this paper we have argued that two core dimensions of meaningful work are *autonomy* in terms of how workers carry out their work, and *recognition* of the value of their work from others (Bolton, 2007; Hodson, 2007). Existing work has shown that low-skilled work such as shopfloor work and some forms of ‘dirty work’ are strongly associated with alienated and meaningless work; such workers have little autonomy and are considered to be not ‘deserving of making decisions’ (Breen, 2019, p. 60). They are routinely ‘denied respect and recognition’ (Costa, 2023, p. 8). It is largely assumed that low-skilled work lacks the autonomy and recognition that are characteristic of highly skilled work and craftwork. We challenge these assumptions and show that workers may agentially find opportunities for autonomy and recognition by engaging in anomalous craft within their work roles through bottom-up, self-initiated behaviours and informal activities that draw on latent craft skills and attitudes.

Meaning in low-skilled work

First, our paper contributes to the meaningful work literature, which has largely ‘been framed around certain (more privileged) types of classes of work’; as a result, the prominent models of meaningful work focus on high-skilled workers, overlooking those in low-skilled or unskilled roles (Rosso et al, 2010, p. 117; Laaser & Bolton, 2022). Prior research on low-skilled labour suggests that individuals seeking meaning in such roles are limited to reframing the importance of their work (Dutton et al., 2001) or engaging in acts of organisational resistance (Hodson, 2007). We challenge these assumptions by illustrating how, through anomalous craft, workers in low-skilled roles can gain autonomy and recognition (normally associated with high-skill roles) within their work. It could be argued that what we describe here to some extent amounts to a form of self-exploitation since the workers gain no formal additional benefits from exercising their craft skills to produce

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3 quality output and ensure the smooth running of the work processes; their work continues to
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5 be cast as low-skilled and poorly paid. However, in seizing opportunities to decide how best
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7 to prioritise, organise, and complete their work, negotiating with their managers, and making
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9 decisions bilaterally, the workers are creating an avenue to more meaningful work in that
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11 they acquire more autonomy and receive recognition of their skills from peers and/or
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13 supervisors (Hodson, 2007; Steiger & Form, 1991). Although (the importance of) their skills
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15 are not formally acknowledged by the organisation, workers can become informally
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17 recognised as having skill through ‘mastery of the complexity of the tasks required of
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19 workers in their jobs, and mastery of the relations that coordinate activity across these tasks’,
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21 and sometimes gain privileges thought to be rarely afforded to workers in low-skill jobs
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26 (Adler, 2004, p. 245/246).
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28
29 Much of the existing literature of meaningful work is rooted in the fields of
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31 organisational behaviour and psychology, where the internal cognitive-emotional experience
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33 of individuals takes precedence over social and cultural factors (Rosso et al, 2010). Existing
34
35 research on meaningful work has ‘largely ignored social, other-oriented, and community-
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37 based perspectives on the nature of work in favour of individual perspectives’ (Rosso et al.,
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39 2010, p. 119). By moving away from micro-level and intrapersonal mechanisms and
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41 following a more sociological and philosophical tradition, we are able to draw attention to the
42
43 dynamic and changing social and contextual sources of meaning at play in low-skilled
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45 contexts. We therefore expand ‘understanding of how other persons and cultural norms
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47 matter for meaning’ and advance a ‘more integrative and dynamic model...[of] meaning’ in
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49 work (Rosso et al., 2010, p. 119). Traditionally, meaningful work has been seen as static and
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51 dichotomised into high-skilled jobs that are perceived as inherently meaningful (workers can
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53 express themselves and derive a sense of self-worth and respect; Hodson, 2007), and low-
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55 skill job roles that are perceived as meaningless (stringent managerial control limits workers’
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3 autonomy to engage in meaningful tasks; Braverman, 1974). However, our paper
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5 demonstrates that the concept of meaningful work is more nuanced, as meaningful work can
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7 coexist with meaningless work within the same job roles. Even within low skill and tightly
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9 controlled job roles, workers can find opportunities to exercise agency and engage in
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11 productive work activities that enhance the meaning of their work. We therefore challenge
12
13 the binary view of organisational control and workers' agency as opposing forces by showing
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15 how they co-exist and interact in complex ways in low-skilled work environments. We
16
17 demonstrate the role of both context and social relations in moving work from meaningless to
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19 meaningful as engagement in anomalous craft is contingent on contextual (i.e. temporal)
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21 conditions and engagement with peers and supervisors, who are central to the process of
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23 creating more meaningful work.
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28 *Time as a resource to find meaning at work*

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30 Our paper also contributes by emphasising the critical role of time in finding meaning
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32 at work, particularly for workers in low-skilled roles. We show how workers use temporality
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34 as a resource to engage in anomalous craft allowing them opportunities to transcend their
35
36 routinised tasks. Previous work has shown that workers often endure a 'wretched struggle
37
38 with time', that time can be malleable and 'drag' or 'fly by' and that workers manage
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40 monotony and fatigue by playing with the construction of time (Holt & Johnsen, 2019, p. 11;
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42 Butler, 1995; Kent & Granqvist, 2024). In this paper we show how workers time-hack to
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44 reshape and change the time available to them and the tasks they should be carrying out
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46 according to their official work schedule in order to introduce moments of engagement and
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48 meaning through craftwork. In his seminal work 'Banana Time' Roy (1959, p. 158) describes
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50 the time-based rituals used by machine workers to interrupt their schedules at fixed intervals,
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52 thereby introducing some variation and enjoyment to a workday otherwise characterised by
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54 drudgery and exhaustion. When these time rituals were disrupted, there came 'the return of
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3 boredom, came a return of fatigue’ and ‘a succession of dismal workdays ... creeping again at
4 snail’s pace’ (Roy, 1959, p. 165). We extend this work by illustrating how through time-
5 hacking workers carrying out low-skilled roles do more than just interrupt boredom and
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7 monotony – they can actually find space for partaking in and developing craft.
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12 By engaging in anomalous craft, sometimes alongside colleagues and supervisors,
13 workers can break free from the rigid, structured tasks typically associated with low-skilled
14 labour. During these ‘times’, workers are able to structure their work activity according to
15 their interests and preferences, carrying out their work in a manner more reminiscent of
16 craftsmen than of low-skilled ‘hands’ engaged in routinised tasks where they are ‘told exactly
17 what to do and how to do it’ and ‘supervised closely’ (Braverman 1974, p. 431). This
18 suggests that workers in low-skilled roles are not always mere “hands” performing atomized
19 tasks, closely supervised and denied the opportunity for creativity or quality control
20 (Braverman, 1974). Rather these temporal opportunities for craftwork allow workers to
21 derive meaning from finishing a product that meets their own standard of quality or from
22 creating and designing a complete and ‘finished’ tool, a privilege that is normally assumed to
23 be denied to workers carrying out low-skill work, whose work experiences conclude with the
24 ‘mere summation of activity’ (Roy, 1953, p. 511). Our contribution highlights how time-
25 hacking to find opportunities for anomalous craft enable workers in low-skilled roles to gain
26 autonomy and recognition transforming their experience of time and labour. This contrasts
27 with the dominant view of low-skilled labour as almost entirely routinised and controlled,
28 showing that even within these roles there are opportunities for meaningful engagement with
29 work activities.
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53 ***The existence of ‘anomalous craft’ in low-skill work environments***

54 We also add to the craft literature by illustrating that craft can manifest in unexpected
55 ways within low-skilled job roles, challenging existing assumptions about the nature of craft
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3 and its applicability across different types of work. Even in highly industrialised and
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5 controlled environments where employees follow repetitive and routinised tasks, we show
6
7 how workers can in fact use latent craft skills and attitudes within their work (Kroezen et al.,
8
9 2021). We introduce the concept of ‘anomalous craft’ to describe how workers in low-skill
10
11 settings agentially implement craft skills and attitudes within work processes, making their
12
13 work more meaningful. While craft can be found in a variety of workplace settings, from
14
15 traditional glassmaking (O’Connor, 2007) to contemporary software development (Martin,
16
17 2009), it invariably relates to roles that are seen as skilled, requiring a significant level of
18
19 formal expertise. We question the binary assumption that craft and low-skilled work are polar
20
21 opposites. We show that even in work that officially requires little or no specific skill,
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23 workers can nevertheless manage to find or create windows of opportunity for learning,
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25 retaining and practising craft skills within their formal role and sharing them through
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27 informal apprenticing arrangements.
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33 In previous research that shows the emergence of craftwork in controlled shopfloor
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35 settings, craftwork occurs when management has reorganised the work to allow for more
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37 discretion and work autonomy. For example, Zuboff (1988) shows how blue-collar workers
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39 found renewed meaning in their work despite increased automation when they were
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41 empowered to explore, improvise, question, and enhance their working processes. Workers
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43 whose craft skills are threatened by the introduction of new technology will also fight
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45 valiantly to retain their position. Vallas (2006, p. 1701) outlines a process of ‘craft
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47 usurpation’, in which maintenance technicians engaged in a jurisdictional dispute following
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49 the introduction of new computerised process control systems they viewed as an ‘affront to
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51 [their] dignity’. Anteby (2008) also shows how workers may utilise their craft skills outside
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53 of work to create ‘homers’ or artefacts for personal use (e.g. small trinkets or decorative
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55 items from scrap material on the shopfloor) to preserve traditional craft-like values and
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3 bolster their faltering occupational identity. In our paper, we identify ‘anomalous’ craft as a
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5 distinct form of craft that goes beyond the ‘remnants’ of craft (Anteby, 2008), the resistance
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7 to industrialised alienation through ‘craft usurpation’ (Vallas, 2006), or the resurgence of
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9 craft by the implementation of managerial practices (Kroezen & Heugens, 2019). Rather,
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11 workers designated as low-skilled can retain, develop, and share craft skills, carving out
12
13 increased opportunities to make decisions based on ‘individual judgment, that cannot be
14
15 replicated by machines’ (Kroezen et al., 2021, p. 507) and receiving informal recognition for
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17 these skills.
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21 **Conclusion**

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24 Our work is based on a case study of a firm where the production process was highly
25
26 standardised, repetitive, and controlled, but where the output varied, and new outputs were
27
28 frequently created. Future research could explore whether similar craft strategies can develop
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30 in other types of industrial settings (e.g. where there is mass production of thousands of
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32 identical objects). Our work also has implications for the new forms of technology (including
33
34 artificial intelligence) that are increasing control over workers and reducing their engagement
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36 to highly specific ‘gigs’ requiring less and less skill, in turn rendering more domains of work
37
38 potentially more meaningless (Kellogg, Valentine, & Christin, 2020; Zuboff, 2019). As
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40 Kroezen et al. (2021, p. 516) note, the ‘twenty-first century equivalent [of the 20th century
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42 factory floor worker] may be the gig worker controlled by digital platforms and algorithms.’
43
44
45 While we know much about how such technologies extend the scope of organisational
46
47 control and can lead to new forms of worker resistance (Cameron & Rahman, 2022), future
48
49 work could examine how workers in such contexts use craft strategies to (re)engage in more
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51 meaningful work. It would also be interesting to examine how the notion of craft is being
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53 transformed in the era of automation and technology-driven work environments, and how
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55 craft can emerge and evolve in these contexts. Our work offers insights to organisations that
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3 routinely employ workers to carry out low-skilled work, or which seek to implement new
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5 technologies but also wish to ‘avoid violations of the fundamental value of being human’
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7 (Gibson et al., 2023, p. 25). Building on our findings, organisations might proactively design
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9 opportunities for workers to have creative and meaningful outlets within their work, even in
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11 low-skill or highly automated contexts.
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2
3 *Marjolaine Rostain* is an Assistant Professor of Information System at Warwick Business
4 School in UK. She completed her PhD at emlyon business school, France. She is an
5 ethnographer with a focus on how technology transform work practices, particularly at the
6 intersection of technology and expertise. Her research delves into how workers acquire new
7 skills and adjust to technological implementations.
8
9

10 *Jean Clarke* is Professor of Entrepreneurship and Organization at Emlyon Business School in
11 France. She completed her PhD at the University of Leeds, UK. Her research explores how
12 language and other modes of meaning-making are used in organizations to achieve social
13 actions. She has a particular interest in how linguistic and non-verbal resources are used to
14 manage impressions in interactions often in context of entrepreneurship. Jean's work has
15 been published in outlets including Academy of Management Journal; Academy of
16 Management Review; Organizational Research Methods; Journal of Business Venturing;
17 Organization Studies; Journal of Management Studies. She was Senior Editor at Organization
18 Studies from 2017-2022. She is on the editorial board of AMJ, JMS, OS, OT and JMI.
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Table 1. Data Sources, Collection, and Analysis

	Data Sources	Data Collection	Data Analysis
1	Exploratory Interviews (28)	1. 19 interviews done with employees who work on the production plant: 3 designers, 1 programmer, 2 operators, 3 fitters, 2 plant production managers, 3 supervisors, 2 salespersons, and 3 admin assistants.	1. Start open coding of the 28 interviews. 2. Creation of approximately 200 codes. 3. Combination of similar codes and reduction to 17 distinct categories. 4. Emergence of two opposing clusters across the data: Negative cluster - related to negative attitudes and experiences of shopfloor workers. Includes: management practices that impact negatively on workers; complaints and dislike of role; lack of purpose at work; lack of respect; workers as disposable; low motivation. Positive cluster – related to positive attitudes and experiences of shopfloor workers. Includes: commitment to the job; quality work; enjoyment of work; problem solving; learning at work; collegiality.
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6	Ethnography (28 months)	2. 9 interviews done with individuals in the administrative/management office and some important stakeholders: the CEO, the financial director, 2 quality manager, 2 business unit managers, 1 ex-business unit manager, and 2 customers.	5. Identify that both attitudes were expressed by the same workers. 6. Decision to start an ethnographic study to better understand this dichotomy.
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20	Ethnography (28 months)	1. Presentation of the study to the employees' delegate. 2. Two months of observation, shadowing and following the work processes of one worker each day. Shadowed workers were selected from a sample of designers, programmers, operators, and fitters. Also, during this time, two days were spent with the plant production managers, and one day each with the sales office, administrative assistants, design office managers, programmers' managers, operators' managers, and fitters' managers. 3. One month of ethnography, observing interesting events rather than any specific workers. 4. Five months of ethnography, mostly shadowing each of the shop floor workers. 5. Memos and field notes all typed up at the end of the day. 6. Photographs taken, and videos recorded of the manufacturing processes.	1. Search the fields notes for positive attitudes of workers towards their work. 2. Identify that moments of enjoyment are related to non-routinized activities that required latent craft skills. 3. Compare and contrast each example. 4. Identify the outcomes workers earn from these craft activities as autonomy and recognition. 5. Through iteration between our data and the literature, note that our findings are somewhat unexpected and not fully explained by previous literature. 6. Identify that craft activities were enabled by "time hacking" 7. Analyse and classify the various craft activities into three groups: - Meeting self-defined quality standards - Creating work optimization tools - Revealing informal mastery 9. Call this process 'anomalous craft' since it deviated from normal routine work. 10. Establish that these three craft activities occurred in relation to different aspects of the work and had different outcomes in terms of autonomy, peer and supervisor recognition. 11. Show three interrelated processes where 'anomalous craft' leads to more meaningful work.
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Table 2. Meaningful Work through Anomalous Craft - Meeting Self-determined Quality Standards to Enhance Autonomy

No.	Workers agentially decide to do additional work because of...	Time hacking	Anomalous craft Process: Meeting self-determined quality standards ...	Craft skills and attitudes	Meaningful work
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7	<i>Perceived suboptimal mould quality</i>	<i>By finding time outside working hours</i>	<i>By becoming the decision maker</i>	<i>Embodied expertise and dedication</i>	<i>Increase in autonomy</i>
8	Damien: 'I made a big mould...with many complex shapes, I sanded it too fast	Damien decided to re-sand the mould during his lunch break	The mould had reached the standard required by the organization and was waiting to be shipped to the customer. By touching and looking at the mould, Damien sensed the mould did not reach his own standard of quality and decided to re-sand it.		Damien determined the steps and methods and decided when the mould reached his own quality standard: 'I sanded it until I was satisfied with it'.
9	<i>because I was running out of time...and each day I walked by it [it was waiting on the shopfloor for delivery] I liked it less and less.'</i>				
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13	<i>Perceived suboptimal mould quality</i>	<i>By doing this additional work during unsupervised time</i>	<i>By becoming the decision maker</i>	<i>Embodied expertise and dedication</i>	<i>Increase in autonomy</i>
14	David looked at the CNC machine and said, 'It's completely filthy.'	David took the opportunity to work on this task during the night shift as there were no supervisors present.	David cleaned the machine until it met his standard of cleanliness based on embodied expertise of feeling how dirty the machine was.		David took two hours during his working time to do an additional task that was not set or pre-approved by his supervisor.
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18	<i>Perceived suboptimal mould quality</i>	<i>By being ahead of one's schedule</i>	<i>By becoming the decision maker</i>	<i>Embodied expertise and dedication</i>	<i>Increase in autonomy</i>
19	Mickaël looked at his mould and said, 'My mould doesn't look right.'	Mickaël saw he was ahead of his allocated time for this task and took this extra time to improve the mould.	Mickaël took some sandpaper and polished the incorrect nozzles one by one for a period of approximately 30 minutes until he was satisfied with the mould. He stopped sanding when he felt (by touching the mould) that the surface was sufficiently polished.		Mickaël decided to continue polishing the mould until it met his quality standard.
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24	<i>Perceived suboptimal mould quality</i>	<i>By advocating for extra time.</i>	<i>By securing supervisor support to set standards</i>	<i>Embodied expertise and dedication</i>	<i>Increase in autonomy</i>
25	Christophe noticed the mould had some small defects that were unintentionally created during the machining process.	Christophe sought to convince Stephanie, the quality manager, to give him more time. When she disagreed about the need to polish the mould further, he persisted saying, 'If we don't polish it all, it will simply be a patch-up job'. Stephanie allowed the extra time.	Christophe resumed polishing, continuing for almost another hour until he considered the mould good enough.		While Stephanie could not initially understand why Christophe wanted to polish all of the mould, she eventually agreed that he could polish it wherever he felt it necessary and in the manner he felt appropriate.
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31	<i>Perceived suboptimal mould quality</i>	<i>By advocating for extra time.</i>	<i>Through informal apprenticeship</i>	<i>Embodied expertise and dedication</i>	<i>Increase in autonomy</i>
32	Thierry, touching a metal sheet on the mould: 'Oh it's weird, it's not screwed.'	Thierry went to see Guillaume, the salesperson, to ask him to allow him to do some additional tasks (welding) to fix the metal sheet on the mould even though this was not paid for by the customer.	Thierry started to weld, with Pascal talking him through how to weld the metal sheet properly to reach a high standard of quality.		Thierry sensed the mould did not meet his quality standard and decided, with Pascal's help, to find a solution to this problem. He then worked on a new task (welding) to which he was not normally allocated.
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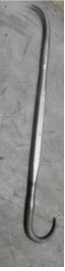








3 **Table 2. Meaningful Work through Anomalous Craft (ctd.) - Creating Work Optimization Tools to Increase Autonomy and Peer**

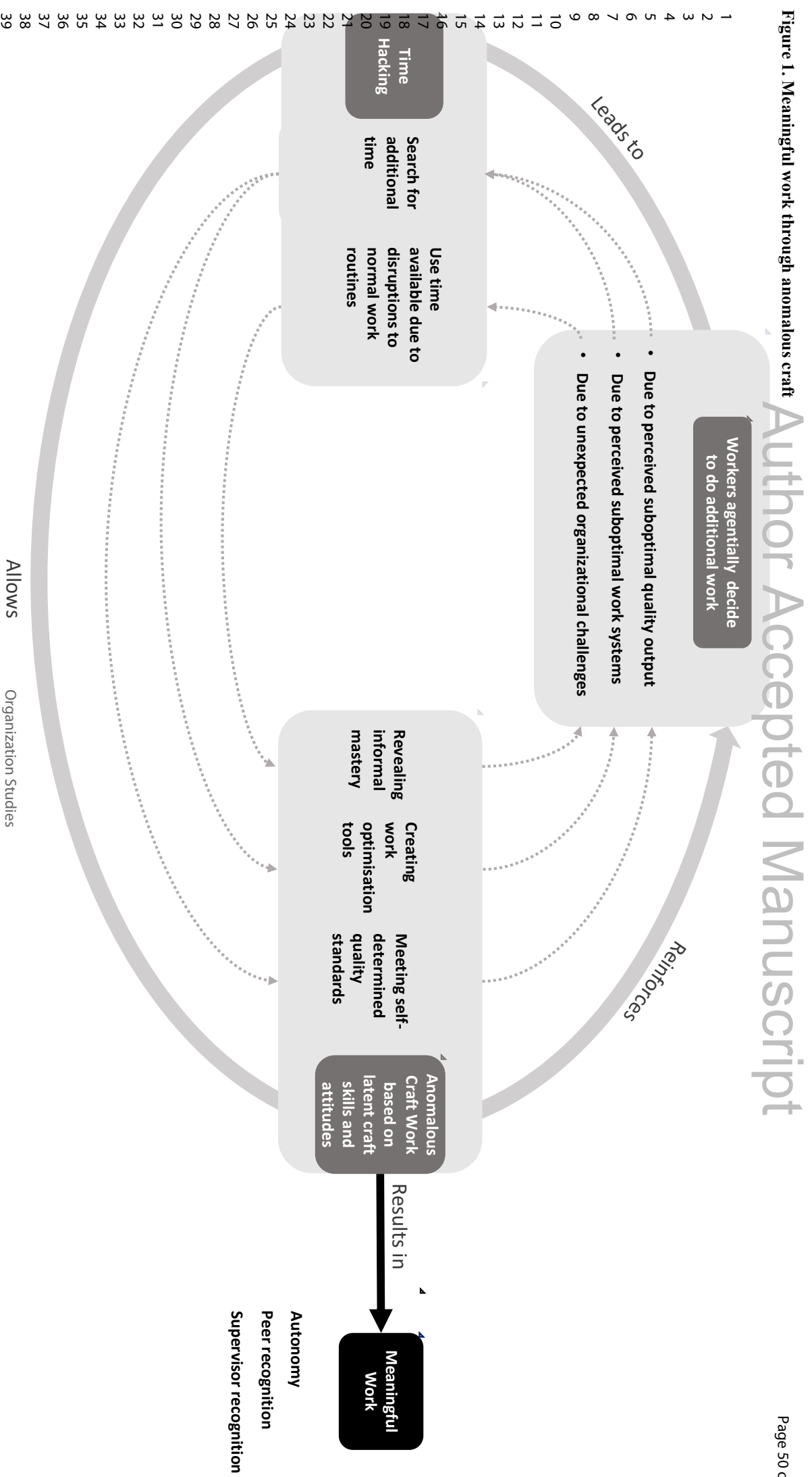
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Recognizers agentially decide to do additional work because of...		Time hacking	Anomalous craft Process: Creating work optimization tools...	Craft skills and attitudes	Meaningful work																																
7	<i>Perceived suboptimal tools of production</i>	<i>By being ahead of one's schedule.</i>	<i>By integrating design into their work</i>	<i>All-roundness and Exploration</i>	<i>Increase in autonomy</i>																																
8	Jeremy thought the work process could be improved by creating a tool that would allow the milling machine to create a circular shape.	Jeremy was waiting for a mould to work on and had nothing to do. He took this extra time as an opportunity to engage in craft work.	Engaged and interested, Jeremy used his understanding of the work process to explore a range of different approaches, successfully managing to create an unofficial tool that, when installed inside the milling machine, created a circular shape.	Jeremy unilaterally decided to design a tool. He conceived, designed, and created it from start to finish.	Workers regularly commented on the ingenuity of this tool, continuing to call it 'Jeremy's tool' even after Jeremy had left the company.																																
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15	<i>Perceived suboptimal tools of production</i>	<i>By being ahead of one's schedule.</i>	<i>By integrating design into their work</i>	<i>All-roundness and Exploration</i>	<i>Increase in autonomy</i>																																
16	Olivier decided to create a new tool that would ease the process of sanding the moulds in hard-to-reach places.	Olivier was ahead of his schedule and used the extra time to create this tool.	Olivier created a tool that was made from an aluminium stick that he split into two parts at the end, into which he could insert sandpaper and polish the corners of very small moulds.	Olivier took extra time to improve the overall mould creation process by designing and creating a new tool.	Olivier's co-workers frequently asked, "Could you lend me your clarifying pen?" to improve their own sanding work.																																
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21	<i>Perceived suboptimal tools of production</i>	<i>By speeding up the work process.</i>	<i>By integrating design into their work</i>	<i>All-roundness and Exploration</i>	<i>Increase in autonomy</i>																																
22	Jean-Pierre: 'I would be much more efficient if I had a tool that automatically aligned the right and the left side.'	Jean-Pierre decided it was worth using some of the time allotted to do his tasks to create a tool that would speed up the process.	Through a process of trial and error, Jean-Pierre created a tool that looked like a metal sheet with a U shape.	Jean-Pierre took the initiative to halt his work so he could design and create a new tool.	Jean-Pierre was widely recognised as skilled by his co-workers. Remi, for example, says, 'Jean-Pierre is so smart, all his moulds are always correct, he knows everything.'																																
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28	<i>Perceived suboptimal tools of production</i>	<i>By advocating for extra time/finding time outside working hours</i>	<i>By collaborating with peers to design new tools</i>	<i>All-roundness and Exploration</i>	<i>Increase in autonomy</i>																																
29	Nicolas sought to optimise his drilling machine process. Existing tools meant there would be bump left on the mould.	Tasked with finding a solution by his supervisor, Nicolas had some additional time. He asked Sandrine to help him, but she did not have a tool that met Nicolas's needs. After designing a new tool with Nicolas, she made it during her lunch break.	Nicolas collaborated with Sandrine in the creation and design of a new tool. They first designed it on paper and then Sandrine created it in her own time.	Nicolas had the opportunity to collaboratively design and create a tool rather than use a pre-existing one. Both Sandrine and Nicolas were able to work together in a way that was not part of their typical work process.	Nicolas acknowledged Sandrine's expertise in tool development and thanked her for making a tool that met his needs.																																
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Table 2. Meaningful Work through Anomalous Craft (ctd.) – Revealing Informal Mastery to Gain Autonomy and Supervisor Recognition

5No.	Workers agentially decide to do additional work because of...	Time hacking	Anomalous craft Process: Revealing informal mastery by ...	Craft skills and attitudes	Meaningful work
19	<i>Unexpected production challenge</i>	<i>By using additional time provided by a lag in the production process.</i>	<i>Demonstrating job expertise superior to supervisor</i>	<i>Mastery, all-roundedness and exploration</i>	<i>Supervisor recognition.</i> Theo, the plant manager, nodded, now understanding, ‘Oh, I see now. Yes, you are right that will be much faster’. Jean-Pierre’s idea is recognised as better than the initial idea
8	Dozens of moulds needed be to machined but all CNC machines were occupied. Theo, the plant manager, tells Jean-Pierre to do it by hand with the manual milling machine. Jean-Pierre, examining one of the moulds, said, “I think it would be more efficient to smooth the surface of each mould before drilling the holes.”	All CNC machines were occupied but the moulds had to be machined as soon as possible. There was therefore a delay in the work production processes.	Jean-Pierre used his expertise and holistic understanding of the making process to come up with an alternative way of achieving this task.		<i>Increase in autonomy.</i> Jean-Pierre was free to carry out his tasks in the manner he suggested rather than having to follow the more monotonous procedure suggested by the plant manager.
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16	<i>Unexpected production challenge</i>	<i>By using additional time provided by a lag in the production process.</i>	<i>Demonstrating job expertise superior to supervisor</i>	<i>Mastery, all-roundedness and exploration</i>	<i>Supervisor recognition</i> Theo recognises that Olivier’s idea is better: ‘Yes, you’re right it would be faster.’
17	Olivier was unable to push an insert inside the mould, making it impossible to assemble the other pieces of the mould as indicated on the drawing as the hole was too small and needed to be remachined.	Olivier could not continue his work and went to Theo, the plant manager, to highlight the problem.	Theo, the plant manager, initially thought they had no choice other than to re-machine the mould with the CNC but Olivier proposed a manual solution that could work better.		<i>Increase in autonomy.</i> Olivier is then asked to explain this solution to Remy another fitter. Theo therefore allows Olivier the opportunity to manage and assign tasks autonomously and direct the activity of others.
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23	<i>Unexpected production challenge</i>	<i>By using additional time provided by a lag in the production process.</i>	<i>Solving problems using expertise beyond their formal work tasks</i>	<i>Mastery, all-roundedness and exploration</i>	<i>Supervisor recognition.</i> The supervisors were unable to solve a problem and recognised that Laurent’s solution would be effective. Laurent made reference to this by asking them in a gently sarcastic tone, ‘Can I leave you two to fend for yourselves now?’
24	Guy and Adil, supervisors, were trying to reassemble a machine they had dismantled to fix. They needed to put the hood back on but were unable to do so.	The machine is broken, and moulds were waiting to be machined.	Laurent took the opportunity presented by this machine breakdown to use his craft skills. He successfully found a solution for lifting the heavy hood and for placing it in the correct position.		<i>Increase in autonomy.</i> Laurent escaped his routinised tasks and engaged in problem-solving. Later Guy saw Laurent doing unauthorized bricolage and remarked, ‘He is the only one who can do that’.
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31	<i>Unexpected production challenge</i>	<i>By using additional time provided by a lag in the production process.</i>	<i>Solving problems using expertise beyond their formal work tasks</i>	<i>Mastery, all-roundedness and exploration</i>	<i>Supervisor recognition</i> Adil, the CNC manager, acknowledges ‘I don’t know how to deal with polystyrene. He asks Arthur, ‘Will you be able to glue something after the machining to recreate the separation between the two holes?’
32	Daniel stopped the machine as one piece of polystyrene had broken off from the rest of the mould. There was no longer a separation between the holes on the mould. The mould needed to be machined again.	The machine has stopped, and several moulds were waiting to be machined.	Arthur, an experienced fitter, suggested that Daniel could take a large piece of polystyrene and glue it onto the area where the piece had broken off and then Daniel could launch the machine again.		<i>Increase in autonomy.</i> Arthur directed himself when engaging in more interesting non-standardised tasks.
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3 **Table 3. New craft tools created**

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		Picture of tools		Name given		Use		How it improves work processes																							
1		<i>Sander with handle</i>	Tool used to sand mould	Workers can sand faster with the handle attached without any injuries																											
2		<i>Meltd sander</i>	Curved metal stem used for sanding inaccessible corners of the mould	Workers can sand areas that were not previously accessible																											
3		<i>Clarifying pen</i>	Metal pen used for polishing a small area that is hard to reach by adding sandpaper at the top of the pen	Workers can polish (really fine sanding) very small areas																											
4		<i>Jeremy's tool</i>	Tool installed in the milling machine to create circular shapes	Workers can use the milling machine when the lathe is occupied to create circular shapes which was previously not possible																											
5		<i>Circular drilling cutter</i>	Circular shape installed around the drilling cutter to stop the drilling cutter at the precise height needed	Workers drill exactly at the right depth																											
6		<i>Handle for file</i>	Foam handle used to more easily grasp a small file	Workers can sand for a longer period of time without becoming fatigued or injured																											
7		<i>Duck's beak</i>	Metal tool used as a pen to write on aluminium	Workers can more precisely mark out on the aluminium where they have to create holes																											
8		<i>Push nozzle</i>	Metal tool used to push nozzles vertically	Workers can push a nozzle into the mould with high precision																											
9		<i>Step</i>	Metal square with precise dimensions to separate two holes	Workers can create different holes spaced by a precise dimension																											
10		<i>Nicolas and Sandrine's Indent Drill</i>	Drill used to create an indent	Workers can use just one tool to create the indent instead of two																											



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