

Class and Gender: Mapping the structure of work-life inequality

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Abstract

The occupational structure of a society can be summarized with indicators of the work tasks involved and the requirements of their performance. Tasks can usefully be indicated by work oriented toward people, data and things, respectively, while the skill level of jobs is indicated by typical educational requirements. On the basis of analyses of data from the Swedish Level of Living Survey (LNU) 2010 we find that the indicators of work content form a structural space of two dimensions, one vertical and one horizontal. The vertical axis has high-skill work and data or management tasks at one end and low-skill work and production tasks at the other end. The horizontal axis has relational work at one end and production work at the other end, oriented toward people and things, respectively, and is unrelated to cognitive skill level. We show that these two (latent) dimensions are strongly tied to class (vertical axis) and gender (horizontal axis), although standard class categories and sex distributions are not included among the (manifest) indicators forming the space. We outline the conceptual foundations of these theoretically fundamental and empirically salient dimensions of work-life inequality, and briefly illustrate their broad domains of application.

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Introduction: background and purpose of the paper

"According to the materialistic conception, the determining factor in history is, in the final instance, the production and reproduction of immediate life. This again is of a twofold character: on the one hand, the production of the means of existence, of food, clothing, and shelter and the tools necessary for that production; on the other side, the production of human beings themselves, the propagation of the species. The social organization under which the people of a particular historical epoch and a particular country live is determined by both kinds of production: by the stage of development of labor on the one hand, and of the family on the other." (Engels 1884, *The Origin of the Family, Private Property, and the State*; quoted in Rubin 1975: 164f.)

"A human group must do more than apply its activity to reshaping the natural world. ... A human group must also reproduce itself from generation to generation. ... Every society has some form of organized economic activity. ... Every society also has a sex/gender system – a set of arrangements by which the biological raw material of human sex and procreation is shaped by human, social intervention and satisfied in a conventional manner." (Rubin 1975: 165.)

Class and gender constitute two core dimensions of stratification in the labor market. Arguably, they are the main axes in the structure of work-life conditions and rewards, perhaps corresponding to the 'twofold character' of production and reproduction described above. Despite their fundamental importance in society – and in the research literature on inequality – the characteristics of jobs that underlie these two dimensions are still not well established. In the present paper we attempt to advance understanding of this issue. What is class? What is gender-typed work? How are the two related? And how dominant are they in the determination of work-life inequality? Such big questions can obviously not be answered in any simple way. Still, we believe that much can be learned by the dense and straightforward approach we introduce here.

The measurement of the class dimension and the gender dimension both have shortcomings in the previous literature. Most fundamentally, the measurement of both class and gender-typed work have had strong tautological properties in earlier research. Class (among employees) has commonly been defined by the grouping of occupational titles *without combining ex ante consideration* of what characteristics that these occupational categories indicate *with manifest measurement* of those characteristics to be used as operational criteria of classification. Gender-typical (female or male) work has commonly been defined by the grouping of occupational titles based on the *sex distribution* of occupational incumbents. In contrast, the approach we develop in the present paper is based on characteristics of jobs seen as underlying major dimensions of work-life inequality but completely distinct from the categories of class and gender in their definition and measurement. Instead, as shown below, class and gender

emerge as outcomes of the underlying dimensions that we distinguish empirically, explicitly tied to theoretical considerations.

In her outline of a theory of occupational aspirations (“Circumscription and compromise”), Gottfredson (1981) summarizes the universe of occupations in a figure with two dimensions: one vertical axis indicating ratings of prestige (from low to high, strongly tied to the hierarchy of class) and one horizontal axis indicating sex-type (from masculine to feminine). The ratings are based on subjective perceptions as revealed in population surveys. Gottfredson notes that these ratings of prestige and sex-type are remarkably accurate in that they correlate very strongly with actual inequality and differentiation (perceived prestige with real education and income, perceived sex-type with real proportions women and men in the occupations). She further observes that the ratings, despite their accuracy, are almost completely detached from descriptions of what the incumbents of these occupations actually do: “Occupational images deal almost exclusively with the life style that occupations afford an incumbent and the type of person that he or she is. These images say little about what people do in these jobs, let alone how to get them.” She concludes that most people do not know much “about job tasks and requirements, but they certainly possess a common general understanding of what it means socially and economically to have different jobs.” (Gottfredson 1981: 551.)

We attempt to bridge this wide gulf in research on work-life inequality between the well-established perceptions and measures of class and gender, on the one hand, and the hitherto vague, unsystematic impressions of work tasks and requirements that would appear to underlie the standard classifications, on the other hand. This detachment of major lines of research on social and economic inequality – using various indices of rank and other differentiation – from research on the detailed traits of different kinds of jobs – the kinds of tasks to be performed and the requirements for such performance – has long been evident. But little has been done to bring the two areas of inquiry together. We aim here to fill this gap.

The paper is organized as follows. We first provide a conceptual outline of how work tasks are structured in the labor market. On this basis, we then discuss the division of labor in society by class and gender, respectively. The empirical analysis, based on data from the Swedish Level of Living Survey (LNU) 2010, begins with showing how the general structure of work content can be summarized by two main dimensions: one vertical and one horizontal. These two axes are then examined with regard to their associations with standard conceptions of class and gender. Some brief illustrations follow of how the two distinguished factors can be used to illuminate central issues of work-life inequality and social change. In conclusion, we situate our empirical findings in a conceptual framework and offer suggestions for future research.

The structure of work content: Tasks and requirements for their completion

Our conceptual point of departure in assessing the structure of work content is the tradition of functional job analysis, originally developed by psychologist Sidney Fine (for overviews, see e.g. Fine and Cronshaw 1999, Cronshaw 2012). Starting in the late 1940s, and continuing through several decades, Fine prepared updates of the US Department of Labor's *Dictionary of Occupational Titles* (DOT; first edition 1938, last revised 1991, last official publication 1999). In this work, Fine began by observing that the early DOT job descriptions were expressed in terms of work aims or results rather than work activities. This was a major problem when using DOT for its primary purpose – as an instrument for the employment service – since successful matching of workers to jobs depends on job-level information on main daily work tasks to perform.

In creating a taxonomy for work activities, Fine (1955) suggested that all work (indeed, all human activity) is oriented toward three basic kinds of activities: dealing with things (physical entities), data (symbols) and people (interaction); TDP for short. This conceptualization was based on a massive data collection through on-site observations of a broad range of work activities and written descriptions of such observations. Factor analyses of highly detailed occupational traits as coded from these observational data support the TDP classification (see e.g. Harvey 2004).

The fundamental unit of work is the task; jobs are collections of tasks, and occupations are collections of jobs. All jobs and occupations consist of some combination of tasks; single tasks are oriented toward things, data *or* people; jobs and occupations consist of many tasks and are hence oriented toward things, data *and* people, although in different proportions. The specific mix of TDP indicates the basic task structure of each job or occupation.

In principle, variation in TDP across jobs and occupations is a horizontal dimension, expressing nominal rather than ordinal differences in work content. Fine further noted, however, that for each task orientation, different levels of complexity were involved in the work activities. Some tasks are easier than others to carry out; typically, the level of task difficulty corresponds to the amount of preparation and training required, i.e., to the level of learning needed for successful task completion. A vertical dimension of complexity was therefore added to each of the three horizontally distinguished task types. This combination of horizontal and vertical dimensions produced a set of three scales: complexity in dealing with things, data and people, respectively. Each occupation in the DOT schema, around 12,000 titles in all, was assigned a value on these three scales (along with other information) in the revised edition designed by Fine, released in 1965.

Several updates of DOT followed, through a final revision published in 1991, with the scaling described above basically intact. During the course of the 1990s, the US Labor Department came to the conclusion that further updates of DOT would be too costly given the very large amounts of work involved in each revision. Further, DOT gradually came to be seen as too strongly tied to the industrial rather than post-industrial world of work (cf. Cain and Treiman 1981). It was eventually decided to replace the DOT with a new classification called the Occupational Information Network (O*NET; first edition 1998; see Handel 2016 for an overview and assessment). The new system is more easily updated via information technology, less extensive analyses of individual work tasks, and a drastically reduced number of occupational titles. While there is still some controversy over the relative qualities of DOT and O*NET, the latter is now firmly established and the former increasingly outdated (or at least no longer updated).

The basic structure of the two classifications are very similar, however. It is notable that recent users of the O*NET in research on work-life inequality (e.g. Acemoglu and Autor 2011, Levanon and Grusky 2016; see further below) rely on work content scales that conform closely to the DOT scales described above. O*NET might be cheaper and more efficiently updated, but Fine's original system of classification appears highly robust even to considerable change in both coding methodology and the technology and organization of actual work. Think of information and communication technologies (ICT), for example, a paramount case of the 'new' world of work. Work related to computer hardware can be seen as oriented toward things, while software use is oriented toward data (symbols), and communication toward people. Apparently, the nominal trichotomy of work oriented toward things, data and people, respectively, as well as the ordinal variation in task complexity, are sufficiently fundamental to dominate most or all major attempts at occupational classification, in older and more recent divisions of labor alike.

Hence it seems safe to conclude that we are on solid ground when basing our mapping of the structure of work-life inequality on the insights from functional job analysis. Due to the strong patterning of work content along the dimensions outlined above, recent measurement in large-scale surveys rests upon the TDP classification in combination with work complexity. In the sixth wave of the Swedish Level of Living Survey (LNU), carried out in 2010, each employed respondent was asked to describe her/his current job by reporting the extent to which the daily tasks are oriented toward people, data and things.¹ A similar interview question was used in the British Skills Surveys in the 1980s and 1990s, but in the LNU survey the indicator on people oriented work was split in two: (a) management tasks (workplace internal leadership) and (b)

¹ A simplified version of the LNU questions on work orientation was included in the fifth wave (2010) of the European Social Survey (ESS). The ESS data can thus be used for international validation of findings based on LNU. (This is not attempted in the present version of the paper.)

tasks involving interaction with people other than co-employees (such as customers, patients, pupils, etc). For each of four task types – management, other people tasks, data and things – respondents are asked to report how large part of their working time is spent on that kind of work. To these four items an indicator of work complexity is added: the educational requirements of the job currently held. As noted above, in the DOT classification work complexity is integrated into each task type, but we prefer to keep nominal task types and ordinal complexity levels separate, for the purpose of analytic clarity.

These five indicators of work content are both necessary and sufficient in order to map the structure of work-life inequality as based on job traits. First, in line with functional job analysis, the trichotomy of work oriented toward things, data and people, respectively, need to be taken into account, since omitting any one of them would evidently make the analysis incomplete. Second, a distinction needs to be made between two kinds of tasks oriented toward people, since internal management and interaction with non-employees are obviously distinct kinds of activities in the context of work-life inequality (and in most other contexts as well). Third, job complexity is a paramount feature of work content, as shown not only in functional job analysis but more generally in several strands of work-life research in various disciplines (see Tåhlin 2011 for an overview). Crucially, job complexity is the single most important characteristic tied to inequality in the labor market; for instance, it is the main correlate of social class among employees (Tåhlin 2007, le Grand and Tåhlin 2013).

Transcending recent lines of research on the structural space of work tasks

Two recent lines of research are precursors of the present paper's attempt at bringing analyses of class and gender together: the sociological literature on occupational sex segregation (Charles and Grusky 2004, Levanon and Grusky 2016) and the economic literature on job polarization (Autor 2010, Autor et al. 2003, Goos and Manning 2007). Both provide partial and complementary insights of relevance to our concerns but none comes close to giving the full picture. In essence, both of these perspectives make extensive use of the DOT/O*Net dimensions described in the section above, but – in our view – with a too limited conceptual outlook, examining either sex/gender or skill/class, although – crucially – not both. The neglect of class in the sex segregation literature, and the converse neglect of gender in the job polarization literature, leads to confusing conclusions regarding the structure and change of work-life inequality. We briefly review these two perspectives below.

Charles and Grusky (2004) argue that today's occupational gender segregation can be explained by two main mechanisms: gender essentialism and male primacy (similar to gender status beliefs; see Broverman et al. 1972, Ridgeway 1997). Gender essentialism is defined as “the belief that men and women are fundamentally different in their capacities, interests, and skills”

(Levanon & Grusky 2016: 575). It pertains to gender differences in the types of domains in which women and men are viewed (by themselves and by employers) as competent. The second mechanism, male primacy, refers to the view that men are viewed or looked upon as more status worthy than women, and are thus assumed to be more suitable for positions of high pay and status. The model explains segregation in terms of the tendency (a) for men to get the best and most desirable occupations and women to get the lesser ones (vertical segregation), and (b) for women and men to sort into occupations that are consistent with presumptions about their respective competencies within vertical levels (horizontal segregation). Thus, this model is similar to Hirdman's (1988) Gender system which is based on the two logics of gender separation and male superiority; accordingly, all areas in life are separated into male and female categories in which the male category constitutes the norm and is more highly valued.

Charles and Grusky (2004) divide work into male and female categories by distinguishing between jobs that require physical strength and other jobs. This dichotomy is related to the perception that men's dominance in size and strength influences the division of labor (see Wood and Eagly 2012 for an overview; we will return to this reasoning in the section on division of labor by gender). In a recent addition, Levanon and Grusky (2016) expand the original segregation model by including two vertical dimensions (prestige and income) and three essentialist dimensions of occupations labelled physical, analytical and interactional aspects of work. Their model to explain gender segregation rests on the following principles: "(a) the 'vertical' presumption that men are (seen as) more competent at /high levels in/ formal workplace /hierarchies/ and accordingly better suited for positions of high pay or prestige; (b) the 'female-advantaging' essentialist presumption that men are well-suited for occupations requiring strength and robustness; and (c) the 'male-advantaging' essentialist presumption that men are well-suited for occupations requiring leadership or analytical skills and women are well-suited for occupations requiring nurturing or social interaction" (Levanon and Grusky 2016: 583). The skills that in Levanon and Grusky's (2016) model are presupposed to be male skills, such as problem-solving and mathematical skills, are highly rewarded in the vertical dimension. Since occupations that contain such work content are highly paid, their perceived association with masculinity provides a male advantage. However, the authors find only weak support for analytical essentialism, as women are only slightly disadvantaged in securing analytical occupations and analytical essentialism is thereby not a significant contributor to male advantage.

Taken together, in the models of Charles and Grusky (2004) and Levanon and Grusky (2016), both the vertical and the horizontal dimensions in the labor market are 'gendered'. Thus, a class factor becomes intertwined with the gender factor, but without explicit consideration of class. Furthermore, the reasoning behind perceptions of male primacy may nowadays, when high-

skill occupations are to a large extent gender integrated rather than a male territory (Hakim 1998, Magnusson 2009, England 2010), be less useful when describing the vertical class order in the labor market. While the model/s of Grusky et al. may be useful when examining gender inequality *within* positions in the vertical order, its conflation with the class dimension in the labor market leads – in our view – to more confusion than clarity.

Aside from the perspective on occupational sex segregation, the literature on job polarization has recently made use of data on work tasks to investigate the structure and change of labor market inequality. The research on polarization, which has become highly influential in many countries (a recent Swedish example is Åberg 2013), grew out of the economic literature on technological change as a driver of shifts in labor demand. The perspective of ‘task-biased technological change’ (TBTC) emerged around 15 years ago as a modification of the ‘skill-biased technological change’ (SBTC) explanation of increasing wage inequality in the United States since the 1970s. The starting point of the shift in perspective was the observation that the pattern of wage growth had changed from being linearly positive across the wage distribution (monotonically higher wage growth from low to high wage percentiles) to being flat or even slightly falling from low to middle percentiles and then rising. Autor and co-authors in several papers (starting with Autor et al. 2003) suggested an explanation for this shift in pattern: the general trend in labor demand had changed from being skill-biased (monotonically rising relative demand along the skill distribution) to being task-biased: rising relative demand for job tasks that are complementary to IT (made more productive by IT use, mainly high-skill white-collar work) and falling relative demand for job tasks for which IT is a substitute (replaceable by IT). The latter tend to be common in semi-skilled jobs, typically located around the middle of the wage distribution, often in manufacturing or lower-level clerical work. A third category of jobs are called service occupations, containing tasks based on specifically human capabilities (such as eye-hand coordination or social skills) that are difficult to replace by computers or other technology, but that require little education or training and are therefore paid low wages; common examples include drivers, janitors and waiters. Relative demand for this kind of labor is rising, partly for technological reasons (automation difficulty). The change in pattern of wage inequality took place around 1990 in the US, which seems to fit the IT based explanatory perspective of TBTC. The distributional shift coincided with a general rise in real wage growth, perhaps similarly tied to technological advances (mainly computerization).

Autor et al. (2003) showed that the TBTC model was basically consistent not only with changes in the US wage distribution but also with changes in the American employment structure. Rather untypically for economists, they looked into detailed data on occupations and job tasks to determine whether jobs of a ‘routine’ character, in the specific meaning of automation potential, were declining in number relative to ‘abstract’ (high-skill non-manual) and ‘service’ jobs (manual service work). For this purpose, they used data from the Dictionary of

Occupational Titles (DOT); see above. As operationalizations of their main concepts, they used the task data to construct scales aimed at measuring 'routine', 'abstract' and 'service' (also called 'manual'), and presented evidence that jobs high on the 'routine' scale had declined in proportion, while the shares of 'abstract' and 'service' jobs had increased.

In somewhat later but substantively parallel work, Goos and Manning (2007) showed similar patterns of change for the UK, and later for several other European countries (Goos et al. 2009). In doing so, they coined the term 'job polarization' to describe the trend of a declining middle of the job and wage structure relative to the top and bottom. Another stream of similar research, starting with Stiglitz in the United States (see Council of Economic Advisors 1996, Wright and Dwyer 2003), developed a method of measuring job quality by cross-classifying occupational with industrial categories and ordering the resulting job cells by their wage level. These job cells (detailed occupation-industry combinations), weighted by their employment share, are then divided into quintiles from high-paying to low-paying jobs. The wage level is taken to indicate the skill requirements of the job. Using this method, it has been shown for a number of countries that the employment shares of especially the top but also the bottom quintile have grown in recent years, at the expense of jobs closer to the middle level of the wage (and supposedly skill) structure.

It is clear that the empirical story of the polarization perspective is closely tied to well-known features of structural change: the long-run decline of male manufacturing jobs and a corresponding rise in services at both ends of the skill structure, with a generally growing role for women. Remarkably, however, most authors involved in the polarization literature rarely mention gender or manufacturing in their conceptual discussion; nor are men distinguished from women or manufacturing from service industries in their empirical analyses.

The correlation between a job's wages and skill requirements is certainly high but far from complete. At any given level of skill requirements, male and manufacturing work have traditionally received wage premia relative to female and service work. There are many reasons for this historical pattern of inequality, including union strength and gender conservative social norms, both waning in recent decades. That is, male manufacturing work has been rewarded out of proportion to its skill requirements, and looking at wages rather than more directly at skill overstates the shrinking-middle story: *middle-wage* jobs (to a large extent held by male manufacturing workers) have dropped much more as a share of all employment than have *middle-skill* jobs. A recent EU report (Eurofound 2011) on changes in the European job structure, based on the Stiglitz quintile methodology, clearly shows this: polarization is much more marked when wage quintiles are used than if the education level of job incumbents is taken as the basis of job rank (ibid., Annex 5, pp. 69-71).

It is therefore useful to move from wages to more direct indicators of job tasks when assessing the TBTC model. The work of Goos and Manning (2007), in turn inspired by Autor et al. (2003), has been used when doing so. As described above, three scales based on US occupational data are used, indicating the three main kinds of job tasks of interest: 'service' measuring manual service work, 'abstract' measuring high-skill non-manual work, and 'routine' supposedly measuring semi-skilled work with high automation potential (in particular, IT substitution). These scales are conspicuously close to the well-established trichotomy of work tasks directed at People ('service'), Data ('abstract') and Things ('routine'). It is curious that the authors never mention this; perhaps they are unfamiliar with the genealogy of their data. The closest correspondence is between the 'routine' scale and Things; they correlate above .80 (according to data from the European Social Survey (ESS) 2010). This strong correlation means that the TBTC measure of their key concept – IT substitutability – comes very close to being an indicator of manual production work (mainly male-dominated manufacturing). Indeed, frequent examples of 'routine' tasks – 'arm-hand steadiness', 'manual dexterity', 'operation monitoring' – appear rather tenuously linked to computerization but more directly linked to traditional manufacturing and other manual production work. Showing that the share of jobs high on 'routine' has declined relative to 'abstract' and 'service' jobs therefore tells us little more than we already knew: manual production jobs are getting fewer.

Similarly, the scales of 'abstract' and 'service' are closely tied to long existing categories of job tasks rather than to the TBTC concepts of IT complementarity or immunity. The correlation (ESS 2010) between 'abstract' and Data (of the TDP trichotomy, i.e., job tasks involving work with text and numbers) is around .50, rising to almost .70 if low-skill and high-skill Data jobs are separated; the correlation between 'abstract' and managerial work is also around .70. The TBTC 'service' scale is very close to People jobs (tasks involving work with customers, clients, etc.); the correlation is about .80. These high correlations do not imply that the TBTC measures are uninteresting or of low quality, only that their validity for the purpose at hand (degree of IT complementarity and substitutability) is questionable, since they evidently measure something else than intended. The implicit TBTC claim seems to be that Things jobs are easy to replace with computers while People jobs are not. But matters are more complicated, since many Things jobs require human capacities, e.g. eye-hand coordination, and many People jobs can be readily replaced by computers (partly in combination with customer efforts), e.g. cashier work in food stores and in commuter services. It would be much preferable to use a measure of 'routine' jobs explicitly designed for the purpose of indicating computerization potential, but so far such a measure appears unavailable.

In general, we think the main problem with the TBTC model is that computerization appears rather ill suited as an explanation of the observed changes in employment structure that the model aims at accounting for. First, the expansion of professional and managerial jobs

('abstract') started already a century ago, long before computers were invented, and has not changed markedly in pace since the IT revolution. Second, the decline of manual manufacturing work (the lion's share of 'routine') is also of old date (although more recent than the rise of high-skill non-manual work), in most OECD countries predating IT expansion (with the US as a partial and perhaps misleading exception). It is also worth noting that skilled manual jobs have significantly increased their share of all manual manufacturing jobs in recent years, which is clearly more consistent with upgrading than with polarization. (Indeed, there are many signs that labor demand for skilled manufacturing work in recent years – even during the great recession – has exceeded supply.) Third, the rise of manual service work ('service') can hardly be explained by computers. At most, automation difficulty (or immunity) can account for a lack of decline of low-skill service jobs, an absolute non-decrease which might result in a relative increase. But at least in the US, there has been a large rise of low-skill service work even in absolute terms, explaining most of its relative expansion. Since IT is neither a substitute nor a complement to these jobs, the absolute increase of their number clearly needs alternative explanations to the one offered by TBTC. In sum, while computerization obviously affects the character and structure of jobs in several important ways, it can hardly explain more than a small fraction of the long-run shifts in employment recently labelled job polarization.

The division of labor by class

In this section we discuss how class inequality among employees is understood in recent major theoretical formulations, and critically assess these perspectives. We conclude that complexity (skill requirements) and authority are the two most important vertical job traits, and work oriented toward data and things, respectively, are the two most horizontal job traits, in a class context. These considerations form the basis for hypotheses on how class (among employees) is linked to the universe of work tasks and requirements. After dealing with class in the present section, we will turn to gender in the section that follows.

All class models – regardless of theoretical stripe – tend to place two job categories at the top of a vertical positional structure among employees: professionals and managers. Skills and authority are hence the two central dimensions of the hierarchical structure of labor market rewards. Different class theories can be sorted with respect to their explanations of *why* skill and authority determine rewards. There are two main types of such explanatory models: one emphasizing power, the other emphasizing efficiency.

Power-based class theories (e.g. Wright 1997, Goldthorpe 2000) use arguments tied to employment relations: professionals and managers have relations to their employers that fundamentally differ from those of other employee categories. Crucially, professionals and managers have a stronger bargaining position than other workers relative to the employer, and

are therefore able to acquire relatively large rewards. In turn, this strong bargaining position is a result of two key vulnerabilities of employers: dependence on scarce skills and on uncertainty of work performance. Professionals' and managers' skills are in relatively short supply and their work tasks are relatively difficult to monitor by the employer. By exploiting these vulnerabilities, professionals and managers receive privileges from employers that other employees are unable to achieve. According to this kind of explanation, then, class distinctions among employees are rooted in labor quantities: relative supply of labor power (potential work) and relative supply of actual labor (delivered work). In order to ensure sufficient quantities of labor power and labor, employers offer material rewards as incentives. The required level of such incentives is higher for professional and managerial jobs than for other jobs – hence class inequality in rewards.

In contrast, class models based on efficiency mechanisms are rooted in labor qualities: some kinds of work are more productive than others. Functionalist theories of stratification are examples of such models, although only some of them (e.g. Parsons 1949) are explicitly phrased in class terms; others speak more generally of stratification (e.g. Davis and Moore 1945), status (e.g. Ganzeboom et al. 1992) or prestige (e.g. Treiman 1977). Professionals and managers are able to achieve relatively large rewards because the work they do is of a larger value to employers (or of a larger importance for society) than other kinds of work, i.e., because professional and managerial work is more productive (yields a larger and/or better and/or more important output per time unit) than other work.

Theoretically, the efficiency line of explanation – based on labor qualities (rather than quantities) – is both simpler and more profound (fundamental) than the power line of explanation. It is simpler because it uses fewer and more straightforward mechanisms: work is simply rewarded in proportion to its productive value. While simplicity (all else equal) is a theoretically attractive trait, more important is that the efficiency model is more fundamental. The power model is based on arguments tied to labor quantities. Professionals and managers are (believed to be) more able than other workers to extract large rewards from employers by threatening (explicitly or implicitly) to withhold their supply of skills and effort. In this context, the crucial question is why employers find it rational to pay such surplus rewards. If supply and effort in some kinds of jobs are not forthcoming at the level of rewards for other kinds of work, why not simply cut such demanding jobs from the work organization? In other words, why do employers create and keep (relatively) expensive jobs rather than filling their organizations exclusively with (relatively) cheap ones? For some reason, employers must believe that professionals and managers are worth hiring and keeping, despite the relatively high material cost for doing so. It is hard to see any other reason than the belief (correct or not) that the value of professional and managerial work is higher than the value of other work, i.e., that it is more productive than other work.

The theoretical conclusion is that the power model's attempt to escape from the productivity mechanism fails: the escape consists in formulating a bargaining model with differential threat capacity across employee classes, rather than differential productive capacity, but the threat capacity in turn can have no rational basis other than productivity (either real or merely perceived by employers, but delusional employers will hardly survive competition in the long run).

Aside from these logical or conceptual considerations, there have also been empirical tests of the power-based class model (Tåhlin 2007, le Grand and Tåhlin 2013). These tests have clearly shown that the empirical basis of the power model is very weak. Class differences in scarce skills and in monitoring difficulties are simply far too small to affect class differences in rewards to any significant extent. Theoretical and empirical arguments taken together thus strongly indicate that power-based class models should be abandoned or at least extensively revised.

A much more promising theoretical account is to explain class inequality by mechanisms tied to efficiency. The empirical jury is still out, however. The main problem is that variation in productivity across job types is very difficult to measure; indeed, it has never been done. While there is plenty of empirical evidence pointing in a supportive direction of a productivity-based explanatory account of class inequality, all available evidence is circumstantial. Below, we summarize and discuss the state of the art of relevant research on the topic.

Skill requirements are linked to economic rewards through productivity and individual skill formation: Employers pay higher wages for skilled jobs because such jobs are more productive, i.e., produce larger economic values per time unit. Workers demand higher wages for skilled work because they have paid for skill formation (time and effort spent on education and training, including foregone earnings) and expect returns on their investments.

Authority is linked to economic rewards in part along parallel lines with those of skill-based rewards – through productive value and skill formation costs. But in addition, work organization morale and other motivation issues are strongly involved in the case of authority-based premia. Some workers in jobs with high skill requirements or large authority are paid more than their marginal productivity, for reasons tied to productivity at the collective level. Career incentives need to be upheld through a rational and legitimate *long-run pay structure*, that in turn will not always be perfectly aligned with actual, *contemporaneous* work output by *individual* job incumbents. In addition to collectively rational career incentives, work organization morale requires a congruence between pay and hierarchical job level, especially concerning authority (management tasks) since subordinates' respect of their manager's authority will be undermined if the managers' pay does not exceed their subordinates' pay (see e.g. Hedström 1988 for a discussion of the relevant literature on pay differentials in formal hierarchies).

Unions (generally, i.e., among all worker categories) see skill requirements and authority as legitimate grounds for wage rank – that more skilled work should be paid higher wages than less skilled work, although different unions (representing different worker categories, including differently skilled workers) disagree on how large this wage differential should be.

Governments agree, as shown by the criteria of legitimate grounds for wage differences given by anti-discrimination authorities (like DO, *Diskrimineringsombudsmannen*, in Sweden).

Employers pay wages according to supply and demand. Productivity determines (although not completely) both supply and demand. On the supply side, skilled workers can carry out both skilled and unskilled jobs, while unskilled workers can only carry out unskilled jobs, which means that labor supply is – in principle – larger in unskilled jobs than in skilled jobs. The ‘in principle’ means that the supply differential is valid with regard to capacity but need not apply with regard to motivation: skilled workers prefer skilled jobs, and will avoid unskilled jobs if possible given the labor market situation. (Many unskilled workers may also prefer skilled over unskilled jobs, but are of course in a weaker position in competing for skilled jobs than skilled workers are.) The demand for skilled workers is structurally (i.e., net of cyclical factors fluctuating around zero) higher than for unskilled workers because skilled workers are more productive.

Aside from skill requirements and authority there is a third clearly class related job trait: manual versus non-manual work tasks. Manual tasks can be indicated by work oriented toward things, while non-manual tasks can be indicated by work oriented toward data or symbols. This distinction is empirically associated with skill requirements and authority, since the latter – for a variety of reasons – tend to be lower on average among manual than among non-manual workers. Yet, the manual/non-manual distinction is qualitatively different. Skill and authority are vertical (hierarchical) job traits that can be clearly ranked on a scale from high to low, and are commonly accepted (by both employers and labor unions, e.g.) reward criteria. The difference between manual and non-manual work is of another kind. Historically, white-collar occupations have tended to have a higher social status than manual worker occupations, reflected e.g. in the border between the office and the workshop. But there is no rational mechanism that can tie this distinction to productivity, aside from its empirical associations with skill and authority. Therefore differences in rewards between manual and non-manual employees, *given* complexity and authority, are apparently based on a pure social construction. The manual/non-manual distinction is hence a horizontal dimension with vertical consequences.

There are at least two causes of these vertical consequences. One is that manual jobs have come to be connected with low skill requirements (especially with regard to educational requirements in the sense of formal schooling) as well as with limited managerial responsibilities (perhaps even zero managerial responsibilities in the formal sense of explicit

managerial or supervisory positions). Manual jobs might therefore be seen as less worthy of rewards, even if the manual/non-manual distinction is not *in itself* viewed as a relevant determinant of rewards (i.e., is not seen as tied to productivity or other markers of performance). To the extent that this explanation is valid, it can be assumed that the social construction consists of suppressing internal stratification within the category of manual workers, in wages and hierarchical divisions, either for ideological reasons – equality as an intrinsic value, or for more instrumental reasons – to maintain collective solidarity as a power device. The net effect of this strategy might have been negative for the average reward level of manual workers by linking manual jobs to low requirements concerning skill and authority. Educational policies also play a role here, by letting formal schooling be close to equivalent with the transmission and development of theoretical rather than practical knowledge.

The other cause of the class relevance of the manual/non-manual divide is the traditionally higher status of mental than physical work. Of course, this is a very old if not ancient status distinction (see e.g. Khan 2001 for an historical overview). Its foundation has typically been the strategies of elite groups in different societies – from East to West, with a large variation in cultural and religious traditions – to ensure that manual work, often physically demanding and socially demeaning, be carried out by relatively powerless groups, not rarely under conditions of explicit or implicit slavery. Conspicuous freedom from manual tasks have been a common indicator of high social status. This hierarchy of work has at least partly survived into modern times despite radical changes in social organization in other respects.

According to some contemporary class analysts (e.g. Wright 1985, chapter 5) the essentially horizontal character of the manual/non-manual distinction makes it less relevant in a class perspective than the vertical dimensions of skill and authority. In our view, by contrast, it is precisely the horizontal character of the distinction that makes its vertical consequences problematic in a normative perspective. For any given level of skill and authority, reward differences between manual and non-manual work to the latter's benefit lack a legitimate basis. In this light, the issue of class becomes recoupled with power rather than (only) with efficiency.

The division of labor by gender

In this section we discuss how gender inequality in working life is understood in major theoretical perspectives. We conclude that vertical job traits have limited relevance in a gender context, at least as compared to the context of class discussed above. But vertical aspects are of course not irrelevant. Especially authority (management tasks) tends to be tied to gender inequality, with negative implications for women, not least a sizeable gender pay gap. The horizontal job characteristic of main interest in a gender context is work oriented toward

people, which we can call relational work. Historically, women have taken main responsibility for such work. This has been the case traditionally in the private sphere of the family and as relational work has successively moved from the home to the external labor market, women's occupational distributions – at least initially – become increasingly concentrated toward people-oriented tasks. Jobs involving relational work have often been contrasted with jobs oriented toward working with things, typically linked to male dominated occupations. These considerations form the basis for hypotheses on how gender is linked to the universe of work tasks and requirements. After dealing with gender in the present section, and then summarizing our hypotheses regarding how class and gender are jointly linked to work tasks and their requirements, we turn to an empirical evaluation of our expectations.

Sex, gender and gender roles

It is difficult to talk about a gendered labor market without a discussion about what gender actually *is*. Here we distinguish between gender and biological sex, or maybe more correctly specified, legal sex; the sex that is registered in the passport. So far Sweden has only two legal sexes. The term sex has a reference to reproductive functions, the biological and hormonal differences between men and women. Gender is socially and culturally constructed, and is an achieved status (or role) based on culturally shared beliefs of masculinity and femininity (Rubin 1975; West and Zimmerman 1987). Individuals internalize beliefs, norms and values and learn through a gender socialization process what characteristics, acts and behavior that are associated with being a female or a male.

The distinction between sex and gender is, however, not unproblematic and has been criticized. The most common critique may be that the division of sex and gender may result in perceiving sex as something static, something that is beyond social and cultural change. But legal sex and the definition of biological sex is also a social construction. Butler (1999), for example, underlines that both biological sex and gender are socially constructed. In contrast, critics from fields outside social science (and the humanities) may assert that the term gender offers too much space for cultural influence, and argue that behavioral differences between men and women are primarily caused by biological and hormonal variation. Rubin (1975) claims that the 'real' differences between men and women tend to be rather modest. Gender is a product of social relationships where humans emphasize and impose distinctions between men and women. Even if men and women on average are different from each other there is also a large variation within sexes.

Regardless of how gender and sex are defined, it is clear that most societies – past as well as contemporary – have some kind of division of labor between males and females. But people differ in their view of the causes of these gender differences, i.e., to what extent they are

biological, socially constructed or the outcome of biosocial processes (biology and society in combination; see Wood and Eagly 2012).

Male and female tasks?

A common explanation to this gendered division of labor is the above-mentioned gender roles which construct the settings of what type of activity that is suitable for boys and girls, respectively, to choose or carry out. Wood and Eagly (2012) assert that the division of labor in society is biosocial and is determined by both a cultural environment and a biological environment where women and men have different attributes. According to Gottfredson's (1981, 2002) above-mentioned classical theory of 'circumscription and compromise', children tend to aspire to occupations that fit with their self-concepts. The self-concept is defined as a person's view of her/himself and consists of elements such as gender role (the most important component), abilities, social status and values. Further, Gottfredson argues that all people in a society share similar occupational stereotypes, such as what types of people occupy different occupations, what kinds of reward they get, what kinds of lives they lead, etc. People share a common 'cognitive map of occupations'. This map has a vertical dimension according to occupational prestige (the overall desirability for different occupations) and a (mainly) horizontal dimension of gender: masculinity – femininity.

Historically this division by gender is rooted in women's childbirths and men's larger physical strength and size compared with women (Wood and Eagly 2012). Today women's reproductive role is less consequential but women still spend much more time in unpaid labor taking care of children and the household compared to men (e.g. Boye 2014). Furthermore, while size and strength could vary both between and within biological sex, childbearing is – so far – only possible for biological women. Nevertheless, women are typically seen as nurturing and caring – relational work – (cf. communion or expressiveness), and men as assertive and powerful (cf. agency or instrumentality) (Lippa 2001, Bakan 1966; see Wood and Eagly 2012 for an overview; cf. Ridgeway 1997). Thus, the division of labor could, simplified, be seen as existing of these two major dimensions which are mutually dependent of each other (Bakan 1966).

These two dimensions (or roles) have, for example, been found in interactions within small groups. Bales (1953) and Bales and Slater (1955) showed that in all groups two types of status roles can be recognized. One leadership role that is responsible for dealing with the problems related to external goal achievement (the instrumental leader) and another role responsible for problems related to internal integration (the expressive leader).

The incumbents of these tasks (or roles) could, theoretically, be equally distributed between men and women (except from childbearing) but the two dimensions of communion and agency are always present in all societies. The tendency to 'gender' these dimensions, where

expressive is seen as feminine and instrumental as masculine, has long been present in many disciplines (see e.g. Parsons 1954, de Beauvoir 2000[1949], Freud 1927, Lippa 2001). In Parsons' theory of the social system, instrumental (husband) actions and expressive (wife) actions are equally important for the system; both contain power, but different types of power (Parsons 1954). The view of instrumentality as a male characteristic and expressiveness as a female characteristic has often been criticized for being myopic and stereotyped. Johnson et al. (1975) build on but modify Parsons' theory and assert that both men and women, or all types of roles, contain both instrumental and expressive actions. They claim that expressiveness and instrumentality are two separate dimensions which do not stand in mutual opposition to each other. This implies that a person could score high (or low) on both expressiveness and instrumentality. Furthermore, and even more important here, Johnson and her colleagues claim that gender is related to expressiveness while instrumentality is not. 'Femininity' might, in general, tend to be more expressive and 'masculinity' to be less expressive, but expressiveness does not exclude instrumentality. Men create their 'masculine' identity by rejecting female traits, but to be less expressive need not imply more instrumentality.

According to this line of reasoning the gendered division of work is primarily related to communion/expressiveness while agency/instrumentality is a separate dimension not clearly connected to gender. From our point of view communion is closely linked to relational work tasks, thus related to the horizontal dimension of the labor market where men and women (currently, on average) carry out different types of tasks: relational work, on one side (female work), and work oriented toward things on the other (male work). Agency is instead related to the vertical dimension (the class order) in the labor market and thus not tied to gender, at least not in contemporary societies where high prestige occupations to a large extent are gender integrated (Magnusson 2009).

Most of us would probably agree with a statement that gender roles are more flexible and less stereotyped today compared with the early 20th century. Occupations that earlier were closed for women, such as physician or priest, now have many female incumbents. Since the 1970s the work-life of women has changed as they have increased their participation and time in paid labor, decreased their time in unpaid labor, increased their level of education and to a large extent entered high-skill occupations (Blau and Kahn 2017; England 2010; Neramo 1996; Olivetti and Petrongolo 2014). In that sense the vertical dimension of gender has become much weaker over time. This change has also influenced beliefs of gender relations. Many studies point out that gender differences in personality and behavior have declined during the 1900s, much due to an increase in women's 'masculine' attributes although the gender difference in feminine attributes has changed less (Twenge 1997; Wood & Eagly 2012). Accordingly, theoretical conceptions of male primacy were relevant when understanding the historical division of labor but have less explanatory value when understanding contemporary societies.

In contrast, the horizontal dimension remains strongly tied to gender. In line with Gottfredson (1981) we hypothesize gender to be clearly linked to the horizontal dimension of work-life differentiation but much less systematically to the vertical dimension. Thus, we expect that the 'role' of communion/expressiveness in contemporary society is linked to gender while that of agency/instrumentality is not.

Despite these expectations, however, we do not yet have a sharp view of what gender-typed work actually is. Our contribution here is that we, unlike much prior research, do not base our conception of gender-typed work on the sex distribution of occupational incumbents. Thus, we do not force the gender dimension to be based on sex as a legal (or biological) category. Moreover, in our model, in contrast to prior research (e.g. Charles and Grusky 2004, Levanon and Grusky 2016) we do not, in advance, firmly ascribe aspects of work content or skills as either masculine or feminine. While we, guided by previous research, formulate explicit hypotheses concerning how the structure of work content might be linked to class and gender, we avoid preconceiving the dimensions to be examined. Lastly, we simultaneously consider class and gender as separate dimensions without forcing them to be related to each other in any particular manner.

The dimensional structure of work content: hypotheses on divisions by class and gender

The discussion above has indicated that five job traits are fundamental in working life: the vertical characteristics cognitive complexity and authority, and the horizontal characteristics of work oriented toward data, things and people, respectively. We hypothesize that these five traits are related to class and gender in the following way.

Hypothesis 1: Job complexity and Authority are rank traits and therefore tied to one or more vertical (not necessarily the same) dimension/s.

Hypothesis 2: Work oriented toward Data and Things, while being horizontal traits, are nonetheless inversely related to each other in a vertical dimension (reflecting the distinction between manual and non-manual work, a horizontal division with vertical implications).

Hypothesis 3: Work oriented toward People and Things, being horizontal traits, are inversely related to each other in a (mainly) horizontal dimension.

Hypothesis 4: Class is mainly tied to one or several vertical dimension/s in the structural space of work content.

Hypothesis 5: Gender is mainly tied to one or several horizontal dimension/s in the structural space of work content.

Empirical findings

We begin the empirical analysis with examining – by factor analysis – the structural space of work tasks, and then go on to compare this structural space with existing measures of class (occupational schemas with predetermined class categories or prestige values derived from subjective survey indicators) and gender (occupational schemas with categories defined by sex composition).

The analyses are based on the Swedish Level of living surveys (LNU). The LNU surveys are based on a representative sample of Swedish adults between 18 and 75 years of age and comprise both cross-sectional and panel data. The surveys have so far been conducted six times: 1968, 1974, 1981, 1991, 2000, and 2010. Here we use data from the five most recent waves, 1974 to 2010.

We first transform the individual-level data on the five work content indicators to cell means in an occupation-by-industry matrix with 45 categories (five SEI occupational classes by nine industries).² Each individual then receives the mean values of the occupation/industry cell containing her/his current job. There are two reasons for the transformation. First, while the indicators of work orientation are based on interview questions that (in line with functional job analysis) allow several orientations for each job, in practice the orientations are to some extent alternative and hence mutually exclusive. This introduces negative correlations between orientation items that to some degree reflect questionnaire design rather than real-life associations. It is important to minimize this bias in order not to distort the dimensional analyses that are based on correlations. Aggregation of individual responses by job category (occupation by industry cells) should be highly instrumental in this regard. Second, an important purpose of the analysis here is to create measures of work content that can be used outside the context of the particular survey of the present case, LNU 2010. The job-level measures constructed below can be matched to other data sets than the one used here via widely available information on occupational and industrial categories.³

Our first empirical question is how many dimensions the five work content indicators reflect; to find an answer we run a factor analysis. While the indicators are conceptually distinct, in line with the discussion above, their empirical associations might of course form a pattern with a more limited set of underlying factors. Such a pattern makes sense from the viewpoint of functional job analysis: all jobs and occupations contain a mix of task types, although in

² The five occupational classes of employees are unskilled workers (SEI 11-12), skilled workers (SEI 21-22) and three levels of white-collar employees (33-36, 46, 56). The nine industry categories are primary industries, manufacturing, construction, trade, hotels and restaurants, transport and communication, banking and insurance, public administration, care, education, and other services.

³ The SEI by SNI matrix used in the present version of the paper is preliminary and will be replaced by a more generally applicable classification based on ISCO and NACE, possibly aided by data from ESS 2010 (see footnote 1).

different proportions. But most obviously it makes sense from the viewpoint of long-standing traditions of research on stratification and inequality. All the five distinguished indicators are strongly related to central categories in stratification analyses, primarily class and gender. Professionals and managers are the two main groups that in most class schemas constitute the top layer; they are clearly tied to the indicators of educational requirements and management tasks. The distinction between blue-collar and white-collar jobs is linked to the indicators of work oriented toward things and data, respectively. Female-typed work is commonly seen as oriented toward social interaction and can thus be expected to be tied to the people task indicator used here.

In sum, there are strong reasons to expect a clustering of the five work content indicators into a general pattern of stratification. But it is harder to predict the exact nature of such a pattern. While stratification by class and gender is clearly linked to the indicators examined, class and gender categories in themselves are not included in the factor analysis. This is indeed the main point of our approach here: to avoid the tautological practices that have been all too common in previous research. Can central dimensions of work-life inequality be discerned through information on job characteristics without (in a circular fashion) including explicit indicators of those dimensions to begin with?

Table 1. Factor analysis of five work content indicators. Factor loadings (principal components, orthogonal rotation). LNU 2010.

	Factor 1	Factor 2
Complexity	.87	.07
Manage	.84	-.35
Data	.88	-.09
Things	-.81	-.52
People	-.08	.97

Note to Table 1: All indicators are cell means (of individual responses) in occupation by industry matrix, 50 categories (see footnote 3). Complexity is self-reported educational requirements (years beyond compulsory school) of current job; Manage, Data, Things and People are self-reported work task orientations (expressed as work-time proportions) of current job. For descriptive statistics and survey question formulations, see Appendix.

Results of the factor analysis are shown in table 1. Two dominant and distinct factors emerge from the associations among the five indicators. The first is strongly and positively related to management tasks, work oriented toward data and to job complexity (educational requirements), and strongly negatively related to work oriented toward things (manual tasks). The second factor is strongly and positively related to people oriented tasks, moderately and

negatively related to manual tasks (things), and weakly to moderately and negatively related to management tasks. These two factors are the only ones reaching a larger explanatory value than a single indicator, i.e., an eigenvalue exceeding 1, and together account for 85 percent of the full variation of the indicators, 58 percent for the first factor and 27 percent for the second.

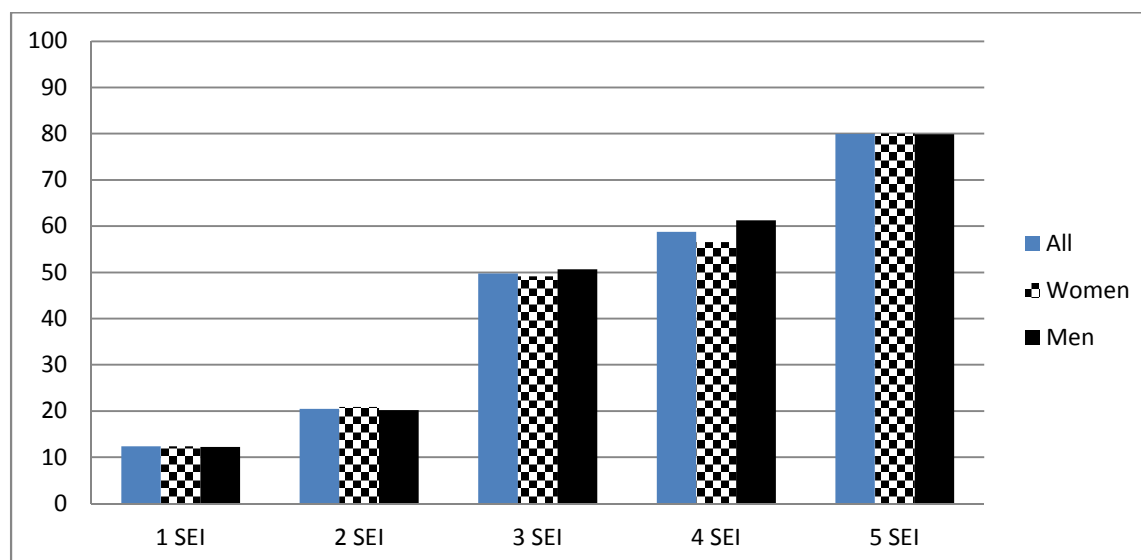
When women and men are considered separately, the two factors displayed in table 1 emerge in a highly similar fashion for both sexes; see table 2. There is only one clear discrepancy: that the moderately negative loading of management tasks in the second factor is present for men only. This indicates that in people orientated work do not seem to have managerial positions.

Table 2. Factor analysis of five work content indicators, separate analyses by sex. Factor loadings (principal components, orthogonal rotation). LNU 2010.

		Factor 1	Factor 2
Complexity	women	,89	,07
	men	,86	,00
Manage	women	,77	,00
	men	,70	-,43
Data	women	,80	-,19
	men	,89	-,18
Things	women	-,84	-,36
	men	-,86	-,42
People	women	-,04	,94
	men	,03	,96

The covariation among the five indicators can thus be usefully reduced to two underlying dimensions, the first clearly (but not only) vertical and the second mainly (but not only) horizontal. These two dimensions are clearly evident also with separate analyses by sex. The similar pattern for both sexes imply that the gender factor is present also when the analyses are based only on men or only on women. A highly straightforward interpretation of this simple pattern is to associate the first factor with class and the second factor with gender. We test this interpretation by looking at how factor scores from the analysis above are associated with standard class categories and the female share of occupations. Results for class are shown in figure 1 and for gender in figure 2. The factor scores have been rescaled to vary from 0 to 100. Figure 1 shows mean values on this factor scale for five class categories (SEI) among employees.

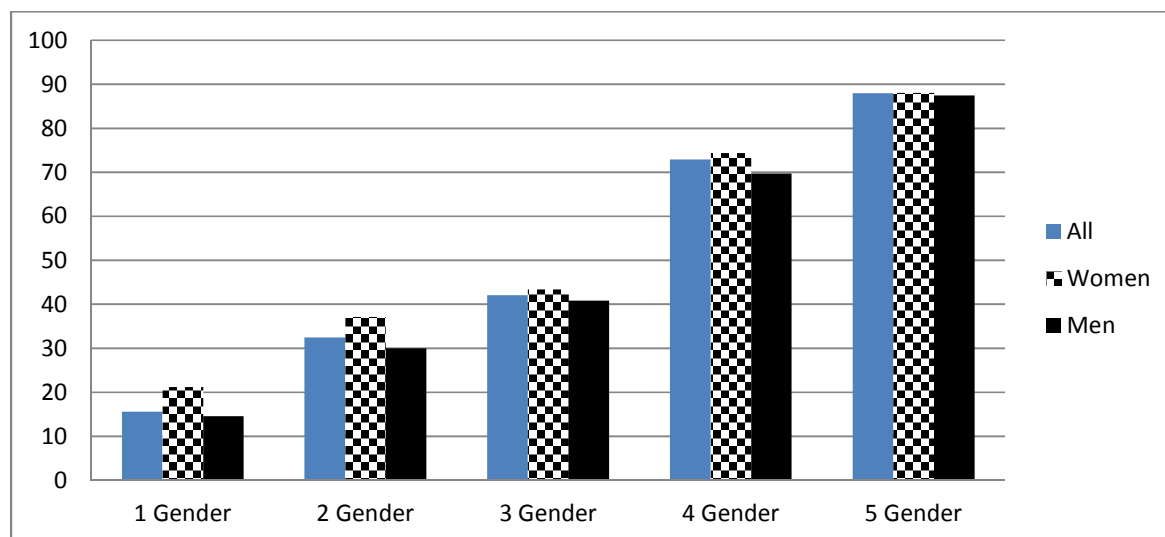
Figure 1. Mean values of factor 1 (labeled as 'class') by standard class categories (SEI). LNU 2010.



The association is extremely strong, with a correlation of .98. This high correlation is partly due to the aggregate nature of the factor scale, as it is based on means by job category (an occupation by industry matrix with 50 cells) rather than individual-level data. But even if the factor scale is based on individual data it corresponds closely to the SEI class categories; the correlation is .72.

Essentially, then, we are able to fully account for the standard class schema with the factor scale based on the five work content indicators. This implies that we have documented – discovered would perhaps be a too strong word given that the associations involved are so well-known, even if not generally acknowledged – what class “is”. Class – among employees, from low to high levels – is work complexity plus management tasks plus work with data minus work with things; in other words, professional, managerial, white-collar work. In one sense, we of course knew this before. In another sense, we have achieved something new: we have (almost fully) accounted for a standard class schema that is operationally based on occupational categories without using any occupational categories, but instead a very small set of indicators of work content.

Figure 2. Female share of respondent's occupation by quintiles of factor 2 ('labeled as gender'). LNU 2010.



In figure 2 we turn to gender. Again, the association is very strong, with a correlation of .70 between the second factor scale – tied primarily to interactive work tasks (oriented toward people) and negatively related to both manual production tasks (oriented toward things) and management tasks – and the female share of the respondent's occupation (ISCO 3-digit level). (The correlation grows to .92 if the female share is estimated in the 50-cell occupation by industry matrix used for the factor analysis.)

We are thus able to account very well for what kinds of work are involved in occupations that are gender-typed from masculine to feminine. The association displayed in figure 2 is very strong; not quite as strong as the association between the first factor and class (figure 1), which was close to complete, but on the other hand perhaps less obvious or at least less well-known. So we now have a measure of female-typed work, a measure based on very simple information, that – crucially – avoids the use of data on gender (such as the sex distribution of occupations) in its construction.

Gender scales have a long history in psychological research (see e.g. Lippa 2001 for an overview), beginning with Terman and Miles (1936). Their approach was to collect large amounts of information on personality and many other kinds of items including occupational interests and then correlate these with respondent sex. The indicators that correlated most strongly with sex were retained and transformed into scales supposedly measuring feminine and masculine psychological orientation. This exploratory line of research subsequently became criticized for being atheoretical, with scales and measures lacking a coherent conceptual basis.

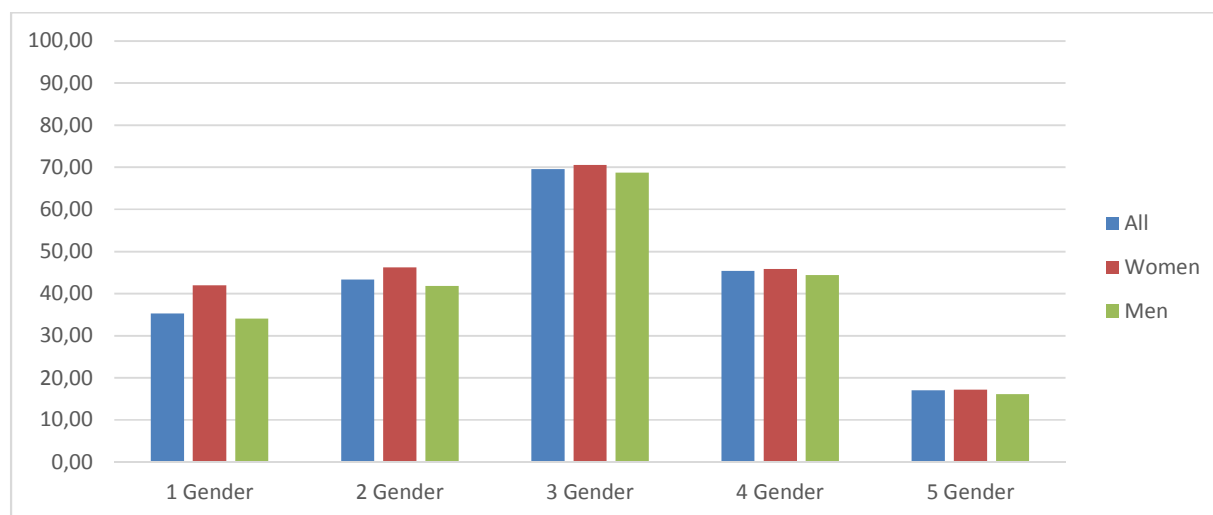
One important lesson has been that gender orientation scales should be designed without using gender in the construction. A strong version of this requirement implies that scales should work well not just across the sexes but within, thus being applicable separately for women and men.

In the present analysis, the sex independence criterion is clearly fulfilled: separate factor analyses by sex result in highly similar outcomes, with the two-factor solution reported above being well reproduced for women and men alike. Correlations between the factors based on joint data for males and females and the corresponding factors based on sex-specific data are all .90 or higher. Hence, not only is the class dimension as estimated here equally applicable to women and men, but the same holds for the gender dimension. We see this as a substantively important finding and a methodologically useful property of the constructed measures.

The factor analysis above constrains (by orthogonal rotation) the factors to be uncorrelated with each other. There are both pros and cons of doing so. The resulting pattern is typically easier to interpret, and the estimated factor scales more useful, when each factor is independent (as in multiple regression). But in reality the underlying dimensions are often associated in more or less complex ways. In the present case of class and gender relations, a well-established finding from previous research (e.g. Magnusson 2009) is that gender is related to vertical axes of labor market rewards (such as class, prestige and wages) in an inversely U-shaped pattern: rewards tend to be low in gender-typed positions, whether female or male, and high in gender-integrated positions. The main proximate reason for this pattern is that working class jobs tend to be gender-typed, dominated by either women or men, while academic jobs and other positions requiring relatively long education tend to be gender-integrated.

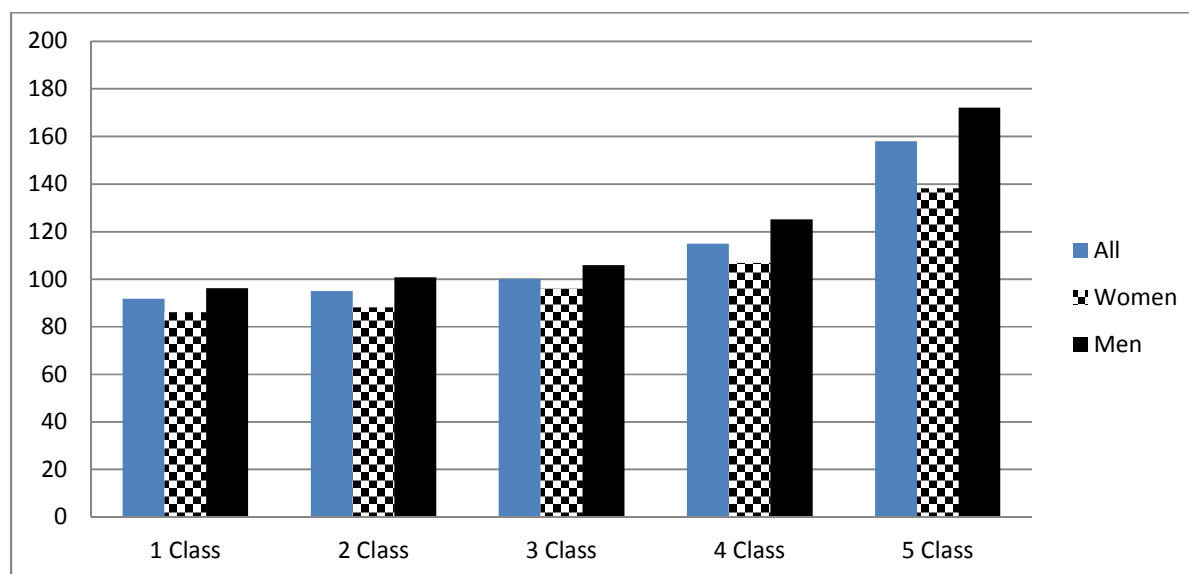
The class and gender factors estimated here are constrained to be uncorrelated in *linear* terms; however, non-linear associations are not taken into account by this construction, and as just indicated they tend to be significant in the class-gender case. On the basis of previous research, we would expect class factor values to be higher in the middle of the gender factor scale distribution and lower toward the gender scale's endpoints. Figure 3 shows that this expectation is met to a large extent. This further supports our interpretation of the two factors as strongly tied to class and gender. The non-linear association between the two dimensions will also be helpful in accounting for the relation between the gender factor and labor market rewards discussed below.

Figure 3. Class factor values by gender factor quintiles. LNU 2010.



Given that the two factors we have distinguished based on the work content indicators are so strongly connected empirically to standard measures of class and gender, respectively, it is reasonable to assume that the factors also predict central outcomes (or correlates) of class and gender. We examine this here by looking at how the 'class' and 'gender' factors are associated with wages and occupational prestige, in figures 4-5 and 6-7, respectively.

Figure 4. Wages by 'class' factor quintiles. LNU 2010.



The association between the class factor and wages is strong and increasing over quintiles, with an R^2 of .30. This is very close to the corresponding association between standard class categories (SEI) and wages, both in shape and size (R^2 with five SEI classes on wages=.29). The almost complete overlap is reflected by a very high correlation (.96) between class factor quintiles and the SEI-wage association. Evidently, the standard class-wage link is almost entirely captured by the work content based class factor measure used here. It can further be noted that the class-wage relation tends to be stronger among men than among women, also meaning that the gender wage gap grows with rising class levels (see Boye, Halldén and Magnusson 2017; this is equally true for both class measures).

Figure 5. Occupational prestige (SIOPS) by 'class' factor quintiles. LNU 2010.

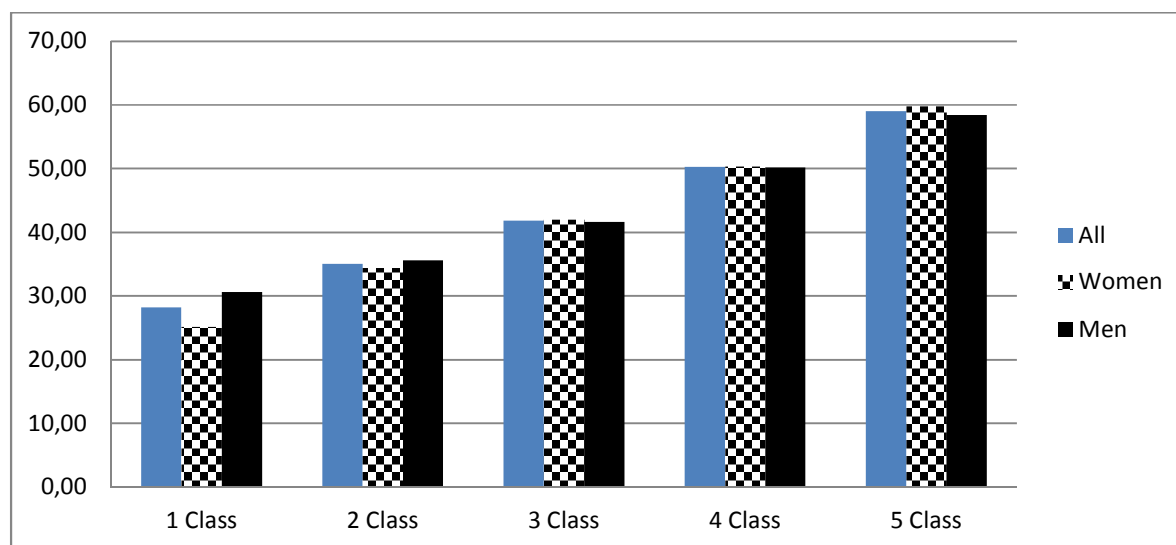
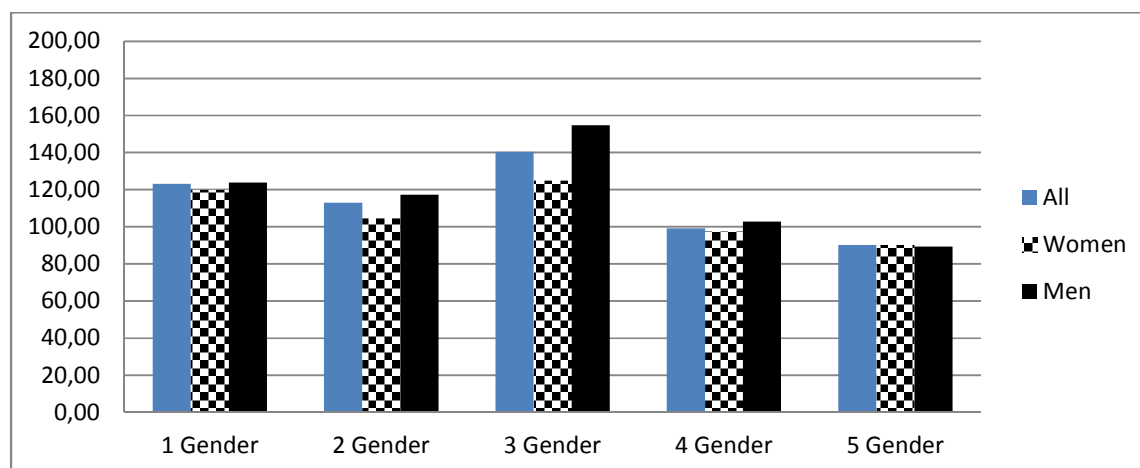


Figure 5 displays the association between the class factor scale and occupational prestige (Treiman's SIOPS scale). The relation is even stronger than between class and wages; the R^2 of class factor quintiles on prestige is as high as .62 ($r = .79$). This is slightly lower than for the corresponding association between SEI class categories and prestige ($R^2 = .66$, $r = .81$). As with wages, the two associations overlap almost completely ($r = .96$).

There are some differences between the class-wage and class-prestige associations (regardless of class measure). First, while the class-wage relation is clearly increasing in strength across quintiles, with a particularly large gap between the upper two levels, the class-prestige relation is close to linear. Second, the class-wage association is stronger for men than for women, but the reverse is true for the class-prestige association: the gender gap in prestige is generally small, only significant to men's advantage in the lowest class quintile and verges on turning to women's advantage at the highest class level. This gendered pattern of wages and prestige across classes is probably due in large part to men's advantage in incumbency of management positions: such work pays off comparatively much in wages, especially at the top, but pays off less in prestige than professional work where women are increasingly acquiring an edge over men.

Figure 6. Wages by 'gender' factor quintiles. LNU 2010.



In figure 6, the association between the gender factor scale and wages is displayed. The association is more or less u-shaped with highest wages in the middle quintile of the 'gender' factor. Thus, both work that score high on the gender factor (work oriented toward people) and work that score low on the gender factor (work oriented toward things) have lower wage than work that are in between, neither things nor people.

Figure 7. Occupational prestige (SIOPS) by 'gender' factor quintiles. LNU 2010.

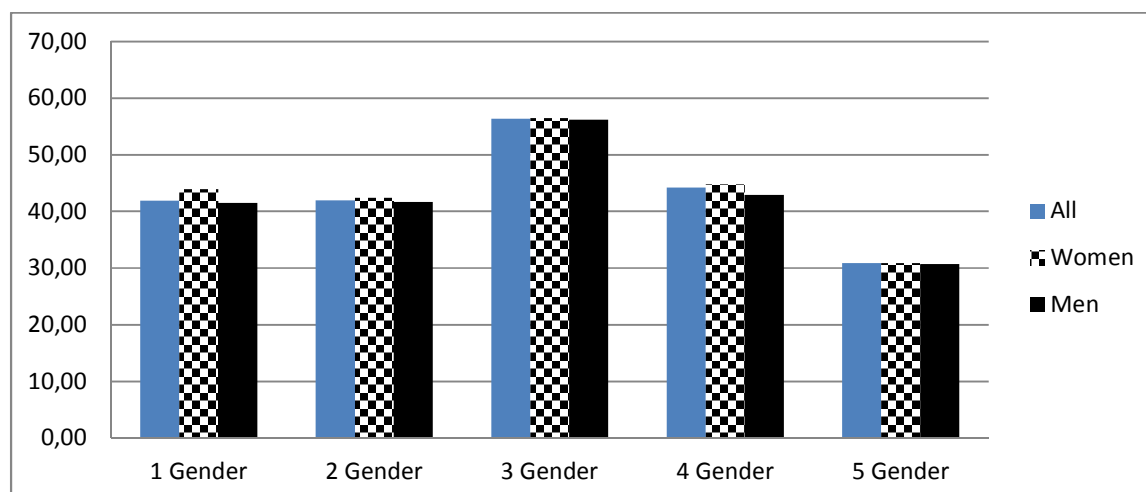


Figure 7 shows the relationship between the gender factor scale and occupational prestige. The relationship between prestige and the 'gender' factor is, like the association between wages and the gender scale, u-shaped. The middle quintile has higher average prestige than both lower and the higher quintiles of the 'gender' factor scale.

The pattern in Figure 6 and 7 relates to prior findings where wages and prestige are highest in gender integrated occupations; thus both female dominated occupations and male dominated

occupations have lower wages than gender integrated occupations (Magnusson 2009, 2010). The main value of the present findings is that they show a similar pattern without using sex, or the female share of occupational incumbents, in the models.

Concluding discussion: Divisions of labor, universal and eternal but socially variable

“A human group must do more than apply its activity to reshaping the natural world. ... A human group must also reproduce itself from generation to generation” (Rubin 1975: 165).

We began the paper by referring to the common observation that the material structure of human life is of a “twofold character”. At an even higher level of abstraction this duality can be seen as reflecting two fundamental ‘modalities’ of human existence: agency and communion (Bakan 1966). They underlie a large number of other conceptual distinctions in patterns of human life, identified since antiquity (see e.g. McAdams 1988, Wiggins 1991).

Agency is the force of power, growth, rationality, productivity and cognition; it is the role of the autonomous person oriented toward the external world. Communion is the pattern of meaning, structure, morality, contemplation and emotion; it is the role of the integrating person oriented toward other members of a social group. The distinction corresponds to a number of similar dualisms: work and family, labor and love, competence and warmth, materiality and morality, and many others. The agency-communion duality is essentially identical to, e.g., Parsons’ distinction between instrumentality and expressiveness (Parsons et al. 1954). We suggest that class (agency, instrumentality) and gender (communion, expressiveness) can be seen as (con)temporary – and thus variable – manifestations of this eternal (constant) duality.

This theoretical or conceptual abstraction is supported by data on emotional requirements of the job. The LNU survey 2010 contains, for the first time, an indicator of such requirements, posed in the same form as the interview questions on work tasks (see Appendix below). When this indicator is added to the factor analyses reported in tables 1 and 2, it turns out that emotional demands are very strongly tied to the relational work dimension (called ‘gender’) and hardly at all to the vertical dimension (called ‘class’). This result, we think, strongly supports the agency-communion conception of the vertical-horizontal space of work-life inequality documented above. Future research should further explore and explicate this theoretical and empirical pattern.

Women and men alike can in principle be located at any point along these two dimensions, although in practice women have tended to be more communal than men – hence the link between sex and gender – while men have held more agentic positions than women – hence

male class advantage. Agency and communion are fundamental, eternal and universal traits of human life – this is the point of using them as analytic concepts – but the intersections between class and gender along the two underlying dimensions are empirically fluid and thus historically variable; they are currently changing rapidly.

Class is clearly less variable than gender in this regard. Even in socialism there is stratification by skill (see e.g. Wright 1984 for a discussion). Communism is the utopian class-less, although of course not agency-less, society where all variation within the agency dimension supposedly occurs within rather than between individuals (either during the course of a single day, as in Marx' 'German Ideology', or as switching between different levels of work over longer segments of individual working lives). In contrast, sex/gender is historically variable, with a decoupling of gender and agency almost completed in many contemporary societies, but with the communion-gender link still strong (or even growing). Still, even this link can obviously be broken, to the extent that the association between sex and childbearing (including child care through infancy) can be cut off, as is currently being done at least for child care, but perhaps emerging for childbearing as well (through new social and technological design).

In general, the long-term change of work-life structures consists of a drift from the lower to the higher pole of the vertical (agency) dimension and from the production to the service pole of the horizontal (communion) dimension. These two shifts on the demand side of the labor market can be labelled skill upgrading and service expansion, respectively. They correspond on the supply side with growing educational attainment and rising female labor force participation. These double movements imply a fundamental transformation of the pattern of working life.

Class and gender are arguably the two major dimensions of stratification in the labor market. As we noted above, despite their fundamental importance the characteristics of jobs that underlie these two dimensions have so far not been well established in the research literature. Our aim in the present paper has been to advance understanding of this issue. What is class? What is gender-typed work? How are the two related? Our analytic strategy has been to bring together two major areas of inquiry: the study of social and economic inequality and the study of work tasks and job requirements. On the basis of a set of hypotheses on how the structure of tasks and requirements underlie the major dimensions of inequality we have used data from the Swedish Level of Living Surveys (LNU) to provide links between the world of work and the world of social and economic stratification and differentiation. Hopefully, we have managed to bridge the gulf that Gottfredson (1981) identified several decades ago: that between well-established perceptions and measures of class and gender distinctions, on the one hand, and vague, unsystematic impressions of the work tasks and requirements underlying these distinctions, on the other hand.

This bridge can lead to several avenues of future research. We now have explicit, non-tautological measures of class and gender. They can be applied to all areas of social and economic life in which class and gender distinctions and interactions are important for the structure and change of living conditions. Hence, the potential domain of application is vast.

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Appendix: Descriptive statistics and survey question formulations

Table A1. Average values of all used variables, by sex (**bold** indicate higher value for one sex than the other); d-values (diff. in means divided by avg std dev) and t-values (B divided by SE; $t > 1.96$ implies stat. sign. diff. at 5%-level) indicate magnitude of each sex difference). LNU 2010.

	All	Women	Men	d-value	t-value
Complexity (educ req's)	3.4	3.5	3.3	0.09	2.8
Manage	19.3	15.0	23.0	0.29	9.5
Data	44.5	45.5	43.6	0.05	1.7
Things	31.8	23.1	39.6	0.42	13.7
People	50.8	61.6	41.1	0.53	17.2
Class factor	40.0	38.9	41.1	0.09	2.8
Gender factor	41.0	52.2	30.4	1.06	32.4
Wage	113.4	103.7	122.5	0.44	12.9
Prestige	42.6	42.2	42.9	0.05	1.8
Female share of occupation	49.0	62.7	35.9	1.13	34.3
Emotional requirements	20.6	30.3	12.0	0.63	20.7

Note: All values in the Appendix table (except Prestige, Class factor and Gender factor) are means of individual-level responses. Complexity is self-reported educational requirements (expressed as years beyond compulsory school) of current job; Manage, Data, Things, People are self-reported work task orientations (expressed as work-time proportions) of current job; Emotional requirements are expressed as work-time proportions. Class factor and Gender factor are factor scores based on the analysis in table 1 (transformed to vary from 0 to 100). Wage is total monetary compensation, transformed to hourly wage (expressed as ratio to overall median), from current job. Prestige (of current occupation) is SIOPS (Treiman).

Survey question formulations (Swedish Level of Living Survey, LNU 2010)

Complexity (educational requirements of the job): "Is any education beyond compulsory school required in your job?" If yes: "About how many years of education beyond compulsory school are required?"

Manage: "How large part of your working time do you lead the work of other personnel, e.g. directing, instructing, coordinating, etc.?" Response alternatives: (1) Not at all; (2) Some of the time but less than half; (3) About half of the time; (4) A large part of the time; (5) All of the time.

Data: "How large part of your working time do you work with text and/or numbers, e.g. writing, counting, reading, editing, etc.?" (Response alternatives as for *Manage* indicator above.)

Things: "How large part of your working time do you work with things, objects or other material, e.g. manufacturing, building, cooking, cleaning, repairing, packing, transporting or similar tasks?" (Response alternatives as for *Manage* indicator above.)

People: "How large part of your working time do you work with customers, patients, pupils or other humans besides other personnel?" (Response alternatives as for *Manage* indicator above.)

Emotional requirements: "How large part of your working time do you work with emotionally demanding tasks?" (Response alternatives as for *Manage* indicator above.)