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Gathering Information on Job Tasks

A New Instrument for Collecting Information on Job Requirements in a Multi-Topic Survey

Second International BIBB/IAB Workshop on T.A.S.K.S. , 17th January 2012

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1. Introduction

Why do we want to collect empirical information on job tasks?

- **Consequences of technological change:** analyzing changes in occupational structure => analyzing change of requirements between and within occupations
- **Social outcomes of changing skill demands:** studying changing skill demands in different occupations => studying changes in individual skills or tasks performed
- **Transferability of tasks between different jobs:** job(title) as a specific manifestation of an occupation => job as a multidimensional composition of tasks

=> theoretically founded, quantitative, empirical tested measure of job tasks

2. Theoretical baseline

TABLE I
PREDICTIONS OF TASK MODEL FOR THE IMPACT OF COMPUTERIZATION ON FOUR
CATEGORIES OF WORKPLACE TASKS

| | Routine tasks | Nonroutine tasks |
|-----------------|--|---|
| | Analytic and interactive tasks | |
| Examples | <ul style="list-style-type: none"> • Record-keeping • Calculation • Repetitive customer service (e.g., bank teller) | <ul style="list-style-type: none"> • Forming/testing hypotheses • Medical diagnosis • Legal writing • Persuading/selling • Managing others |
| Computer impact | • Substantial substitution | • Strong complementarities |
| | Manual tasks | |
| Examples | <ul style="list-style-type: none"> • Picking or sorting • Repetitive assembly | <ul style="list-style-type: none"> • Janitorial services • Truck driving |
| Computer impact | • Substantial substitution | • Limited opportunities for substitution or complementarity |

Quelle: Autor/Levy/Murnane 2003

2. Theoretical baseline

2.1. The four task dimensions

- Routine tasks, meaning tasks which can be accomplished by machines (based on Autor/Levy/Murnane 2003)
- Analytic (cognitive) tasks, meaning tasks which concern to thinking and reasoning such as reading, writing, calculating or using ICT (based on the concept of PIAAC (Levy 2010))
- Interactive tasks, meaning tasks that require to communicate, starting from simple requirements such as dealing with customers or clients and ranging up to complex communication tasks like supporting, teaching or dealing with candidates or applicants (based on Spitz-Oener 2006)
- Manual tasks, meaning task that require to stand, walk or lift something; to do work while assuming an uncomfortable body posture or while being exposed to great heat or great cold (based on BIBB-IAB study (cf. Parmentier/Dostal 2002))

2. Theoretical considerations

2.2. Which are the criteria we used to develop the instrument?

- It should be possible to use it in telephone interviews of individual respondent => simple questions about the job requirements
- It will be implemented in a multi-topic survey => limited number of items (precisely: a maximum of 48 items)
- It should be equally suitable for all work places (for all employed) => rather measure general job tasks than asking for occupation specific tasks (cf. Mertens 1974)
- Items should not directly measure required formal qualifications/skills (which have been collected within the Life Course Questionnaire of the NEPS) but should refer to general job requirements
- Item –formulations should not refer to skills required to perform a job, nor to a subjective estimation of one`s own competencies, but to objective aspects of job tasks => question „Do you have to ...?“
- uniform response formats: e.g. for cognitive tasks: Q: „Do you have to ...?“ – A: “Yes”/”No”, for others: Q: „How often do you have to ...?“ – A: “1: Always/Very often” ... “5: Very rarely/Never”

3. Developing the instrument: the example of routine tasks

3.1. Theoretical considerations

- According to Autor/Levy/Murnane (2003) routine tasks are tasks which can be accomplished by machines and are characterized by
 - a) Predictability (which we operationalized via two sub-concepts)
 - Variety: The higher the rate of performing novel or changing tasks or of problem-solving is, the more the predictability and therefore substitutability of the task decreases .
 - Autonomy: The higher the rate of managing one's own work or coordinating the work of others is, the lower is the predictability and therefore substitutability of the task.
 - b) Repetitiveness
 - The higher the rate of repetitive tasks the higher the possibility that computer programs can substitute it.

3. Developing the instrument: the example of routine tasks

3.2. Milestones (1)

- Adaptation of STAMP-Items (Handel 2007, 2008)
 - Translation from English to German
 - Retranslation from German to English
- Cognitive pretest of selected items
 - Check of comprehensibility and of adaptability to the German context
 - 34 interviews (sample stratified by gender, age, education), transcripts of audio-records, standardized evaluation scheme

=> Dropping problematic items and changes in the wording of less problematic items
- Field development Study
 - Test a first draft of the tasks instrument in order to detect major problems and to reduce the number of items
 - 503 paper and pencil-interviews (in the context of a larger pretest)

=> adapting wording and application of uniform scaling

3. Developing the instrument: the example of routine tasks

3.2. Milestones (2)

- Pilot Study
 - Used to check scales and to validate the instrument
 - 138 panel respondents of the general pilot study who are currently employed
 - Overall, the tasks instrument seems to work well (<3% item missings, apart from “repetitiveness” all sub-dimensions seemed to be well identified)
=> last adjustments of the items used to measure “repetitiveness”
- Main Study
 - Fieldwork of the study is still ongoing
 - Today, we present first results based on a subsample of 458 panel respondents who are currently employed and completed their interview until December 2011

3. Developing the instrument: the example of routine tasks

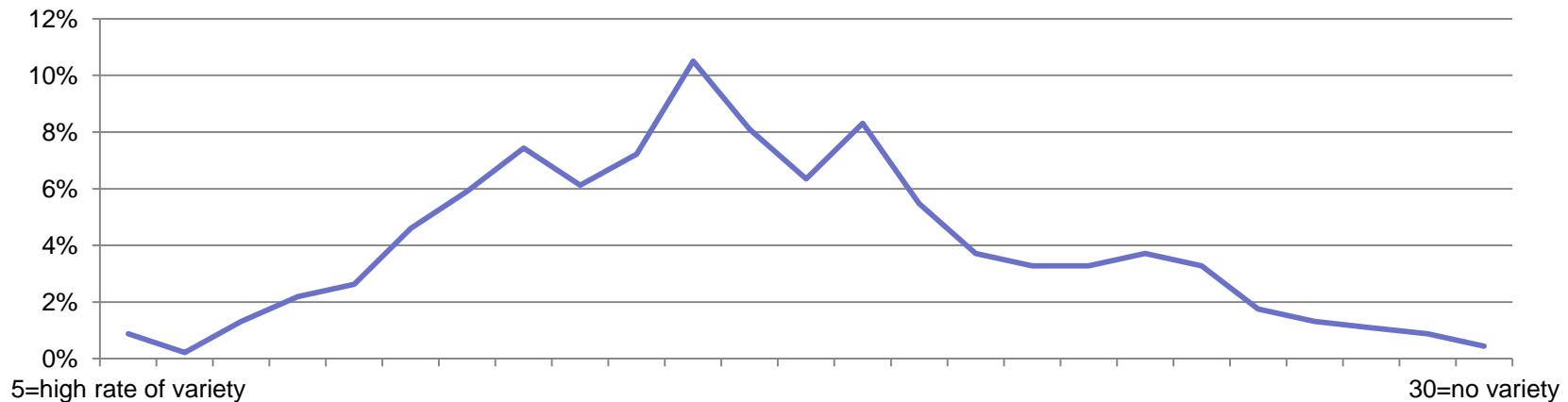
3.3. Task-instrument implemented in NEPS life-course questionnaire

- NEPS - National Educational Panel Study: collects data on educational processes in Germany and is comprised of several surveys covering respondents from early age to the general (adult) population
- The NEPS – adult stage (Adult Education and Lifelong Learning) collects (among other information) information on education and job-histories, which is collected in the context of the life-course questionnaire
- At the end of job histories, task-questions will be asked to current job-holders
- If respondents should currently hold more than one job, a number of questions is used to identify their main job activity (to which task-questions will refer)

3. Developing the instrument: the example of routine tasks

3.4. Preliminary results: Rate of routine tasks - Variety

| Item | Question |
|---------------------------------------|--|
| Solving difficult problems | As part of your job, how often do you have to solve such difficult problems? |
| Learning new things | How often do you have to learn new things at work? |
| Getting acquainted with assigned task | How often does it happen that you are assigned tasks at work you do first have to get acquainted with? |
| Unanticipated situations | How often does it happen that you have to react on situations at work, which could not be anticipated? |
| Change of assignments | How often do the work-assignments at your job change? |
| Performing new tasks | How often do you have to perform tasks at work that you did not do before? |



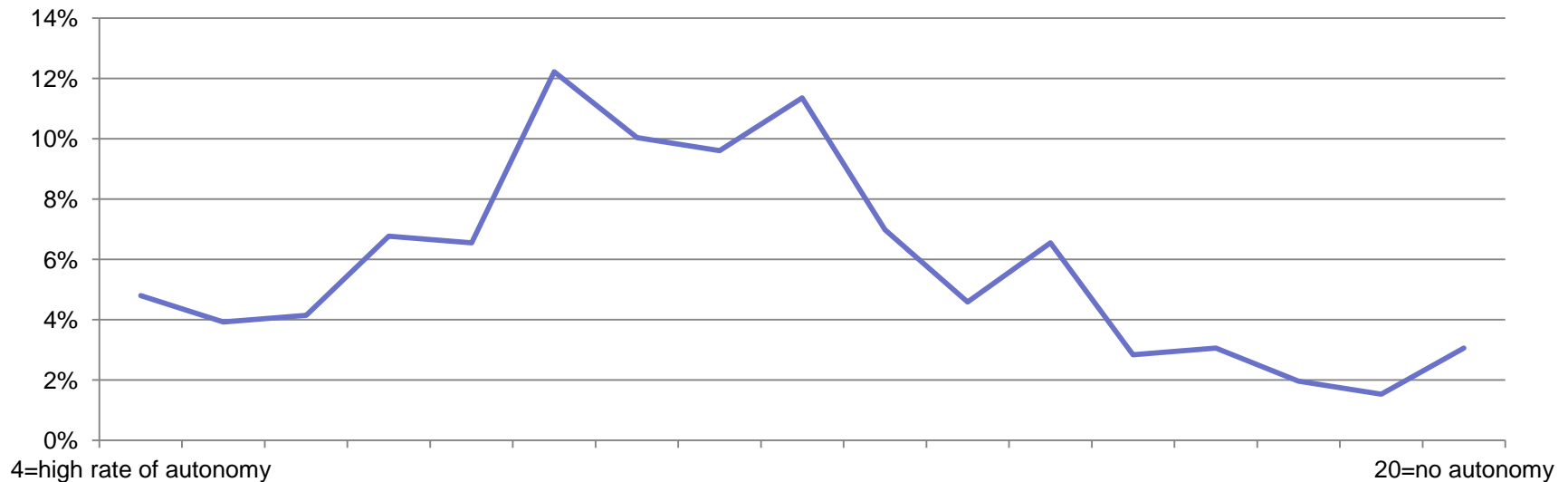
Source: Own calculations

Cronbach's Alpha: 0,80

3. Developing the instrument: the example of routine tasks

3.4. Preliminary results: Rate of routine tasks - Autonomy

| Item | Question |
|---------------------------------|--|
| Scheduling own tasks | How often does it happen that you may schedule your work activities all by yourself? |
| Choosing new tasks | How often is it possible for you to choose new task assignments by yourself? |
| Choosing work pace | How often does it happen that you may choose your work pace all by yourself? |
| Involved in important decisions | How often are you personally involved in important strategic decisions of your company, like e.g. decisions on the kinds of products or services produced, the number of employees, or company finances? |



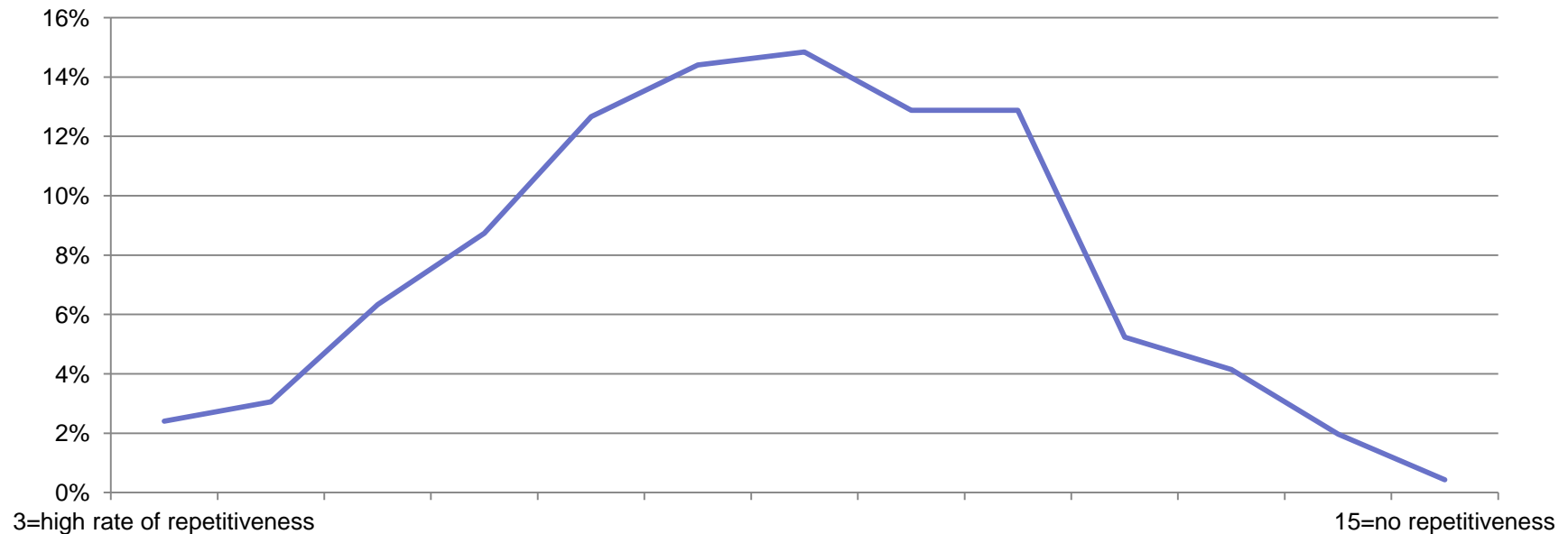
Source: Own calculations

Cronbach's Alpha: 0,70

3. Developing the instrument: the example of routine tasks

3.4. Preliminary results: Rate of routine tasks - Repetitiveness

| Item | Question |
|---------------------------|---|
| Short, repetitive tasks | How often do you have to do short, repetitive tasks as part of your daily work? |
| Equality of working days | How often does it happen that one day at work is just like the other? |
| Specified details of work | How often does it happen that every detail of the work you have to perform is exactly specified in advance? |



Source: Own calculations

Cronbach's Alpha: 0,48

3. Developing the instrument: the example of routine tasks

3.4. Preliminary results: Factor analysis

| | Factor 1 Variety | Factor 2 Autonomy | Factor 3 Repetitiveness |
|--|---------------------|----------------------|----------------------------|
| Solving difficult problems (Variety) | 0.69 | | |
| Learning new things (Variety) | 0.78 | | |
| Getting acquainted with (Variety) | 0.76 | | |
| Unanticipated situations (Variety) | 0.69 | | |
| Change of assignments (Variety) | 0.70 | | |
| Performing new tasks (Variety) | 0.64 | | |
| Scheduling own tasks (Autonomy) | | 0.84 | |
| Choosing new tasks (Autonomy) | | 0.62 | |
| Choosing work pace (Autonomy) | | 0.79 | |
| Involved in important decisions (Autonomy) | | 0.58 | |
| Short, repetitive tasks (Repetitiveness) | | | 0.76 |
| Equality of working days (Repetitiveness) | | | 0.59 |
| Specified details of work (Repetitiveness) | | | 0.67 |

(blanks represent $\text{abs}(\text{loading}) < .5$)

Source: Own calculations

4. Conclusion and outlook

4.1. Conclusion

- task can be described by differentiating routine tasks, cognitive (analytic) tasks, interactive tasks and manual tasks
- routine tasks can be measured by focusing on variety, autonomy and repetitiveness of job requirements
- first analyses indicate that the tasks measures we developed appear to have high reliability and validity
- these measures will allow analyses such as
 - task composition of different work places in same occupations
 - effects of mismatch between tasks performed and skills required

4. Conclusion and outlook

4.2. Outlook

- After finalization of fieldwork in mid 2012 we will do a reanalysis and will fully document development efforts
- Moreover, we hope we will be able to do comparative analyses with U.S. data by Handel
- Data will be available to the scientific community via the NEPS research data center (<https://portal.neps-data.de/en-us/home.aspx>) about mid 2013

Literature

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