TRAC (task recording and analysis on computer)

**General description and development of the method**

This is a generic method to record tasks, actions, or postures in real time or with time sampling on a portable/palm computer. The events (e.g. categories of exposures) have to be defined before the observations. In the applications postures of OWAS have been used. The software will count distribution of the frequency and duration of the selected events.

The method is based on computer software running on a pocket computer (Psion Organiser). TRAC enables the observer to choose and define the variables to be recorded for a specific working situation, e.g. goods being handled, tools and appliances used and forces applied (van der Beek 1992). Later a new version of TRAC system, called PalmTRAC, was developed (van der Molen et al. 2008). Two different options can be chosen for observation: real-time and multimoment. Real-time observation is an event-driven procedure; data entry is only necessary when activity or posture is changing. Real-time observations make it possible to analyse the duration and sequences of activities and the circumstances of interest during these activities. With multi-moment observation the observer has to register the situation repeatedly with a previous selected time interval that is given as auditor-signal from the computer (Frings-Dresen 1995).

Studies have stressed the importance of recording postures and activities simultaneously. TRAC method was originally developed at the Robens Institute University of Surrey, UK) and further adapted by the Study Centre on Work and Health/ERGOcare (Amsterdam, The Netherlands) (Frings-Dresen 1995). Method was described first time (?) in a conference in 1989 (Ridd 1989) (cited by (DeLooze 1994))

**Exposure descriptors**

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Description of exposure</th>
<th>magnitude/amplitude</th>
<th>duration</th>
<th>frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>posture</td>
<td>Postures based on OWAS</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>movements</td>
<td></td>
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<td>.</td>
</tr>
<tr>
<td>(external) force</td>
<td>weights handled</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>vibration</td>
<td></td>
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<tr>
<td>contact forces</td>
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</tbody>
</table>

Gross body postures (stand, walk, sit, and kneel or squat), activity (pull, push, lift, other, and no activity)

**Resource demands and usability**

**Equipment needed**

Portable computer (palm computer) + software

Observations can be done from video recordings as well.

**Process of coding and analysis**

The software will calculate the time distribution of selected items (frequency, duration), which can further be processed with standard statistical methods
Output type/level (risk assessment)

Distributions and statistics related to the observed sample

Criteria to help the evaluator to make decision

The method does not include risk assessment and there are no rules for making decisions.

Fields of the working life where the method has been used

- Warehouse workers (Braam 1996), (van der Beek 1995)
- Lorry drivers (van der Beek 1992), garbage collectors, transport workers, forklift truck drivers (van der Beek 1995)
- Construction workers (Van Der Molen 2008, van der Molen 2007)
- Manual Material Handling in laboratory (DeLooze 1994)
- Nurses (Van der Beek 1994), (van der Beek 1995).

Validity

Face validity / Contents validity

Does the method seem to be valid for the aimed purpose?

| 1. The contents of the method is such that a relevant assessment can be expected | yes |
| Comments: Depends on chosen exposures | x |

| 2. Items to be observed have a sound basis | yes |
| Comments: Free choice by the users of the method | x |

| 3. Sound operationalization of the items to be observed | yes |
| Comments: The user have to choose and define the categories of exposures before the observations. |

TRAC is basically a computerized framework for systematic observation, which can be customized according to the preference of the user. Thus, there is no standard set-up of categories. In the studies using TRAC, category cut-offs are, to a considerable extent, based on pragmatic feasibility considerations – a fair decision from a logistic point of view, but risk-important resolution may be missed.

| 4. Sound process to collect data | yes |
| Comments: The process is straight-forward in both the time sample and real-time versions of TRAC. A procedure for designing the sampling strategy (how many samples, how often) and analyzing its performance (precision of the outcome) would be appropriate. A selection of too many items to be observed simultaneously may puts great demands for the observers. |

| 5. Sound process to get the output of the collected data | yes |
| Comments: The software makes automatically predefined calculations |

| 6. Output can help in decision making | yes |
| Comments: TRAC has been developed for exposure assessment, not for decision support |
Concurrent validity
How well does the method correspond with more valid method/s?
Observations vs. optoelectronic measures in simulated material handling (DeLooze 1994)
- Moderate to low correspondence
- The dynamic nature of the tasks may dilute the changes to get similar results with observations performed on sampling of "snapshots"

"Predictive validity"
How well has the risk-estimation of the method been shown to be associated with or predicting musculoskeletal disorders (MSDs)?
- No formal studies

Intra-observer repeatability (within observers)
- No formal studies

Inter-observer repeatability (between observers)
1) (van der Beek 1992)
2) (DeLooze 1994)
- Good to moderate inter-observer repeatability
3) (van der Molen 2007)
- "For activities observed from video the "disagreement between the two observers remained below 6% for all variables" after the training period."
4) (Van Der Molen 2008)
- "The mean intraclass correlation coefficient, as a measure for inter-rater reliability, was good: 0.87 (SD 0.09). The intraclass correlation coefficients varied from 0.71 (95% CI 0.00–0.97) to 0.99 (95% CI 0.89–1.00)."

Conclusions

Strengths of the method
- Computerized registration, the software counts distribution of frequency and duration of the events. Flexibility to select the items to be observed according to the purpose.
- The method is developed for easy use in the field, using a portable computer. It can be customized to fit specific jobs. Collected data are processed using an automatized procedure on the computer.

Limitations in the use of the method
- Does not apply for very dynamic tasks, the user have to choose and define e.g. categories of exposures -> effect on validity, repeatability and accuracy
- Time needed to have a presentative sample (general requirement for time sampling)
- TRAC is mainly focussed on assessing exposure levels; frequencies can be retrieved only in the real-time set-up of the method. Quite some training is required before a satisfying level of performance is reached.
To whom can this method be recommended?

To research but also for practical purposes in occupational health and safety - provided the decision rules have been defined prior the use in the particular case. TRAC is basically a computerized framework for systematic observation, which can be customized to any observable exposure. Thus, while it was developed for whole-body work, it could be tuned also for use in other kinds of occupational activities.

References


