Comparing translational creativity scores of students and professionals: flexible problem-solving and/or fluent routine behaviour?

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Abstract

This paper presents an assessment procedure that considers indicators of creativity in translation such as imagination, optional shifts and uniqueness. All are measured against the backdrop of routine behaviour, which is believed to be the counterpart of creativity and is identified by aspects such as automaticity and total translation time. The assessment procedure is tested with a sample of 12 translations of four ST units including all intermediate (partial) translations. The translators are four first-semester students, three third-semester students and five professionals. Two of the ST units were selected for their creativity potential, the other two because they were thought to prompt routine behaviour. Some support is found for the assumption that successful translators strike a cognitively efficient balance between flexible problem solving and routinised reflex.

1. Background

My PhD research, which forms part of the project *TransComp*[1] (Göpferich *et al.* 2008; Göpferich 2009), investigates the development of creativity in students of translation from their first to their sixth semesters and compares it with the creativity of professionals. In Bayer-Hohenwarter (2009a), it was first proposed to measure translational creativity using the creative shifts *abstraction*, *modification* and *concretisation*. This article describes

[1] TransComp is funded by the Austrian Science Fund (FWF) as project No. P20908-G03 (September 2008–August 2011).

the comprehensive scoring system developed for measuring translational creativity and reports the first preliminary results of its application.

Creativity is a multi-dimensional concept and thus difficult to measure (see Bayer-Hohenwarter 2009a for more details). In the psychological literature, a broad range of indicators can be found though the basic criteria appear to be *acceptability* and *novelty* (e.g. Torrance 1988, Csikszentmihalyi 1997, Sternberg & Lubart 1999); in translation, the most frequently mentioned creativity features are non-literalness and cognitive shifts (e.g. Kußmaul 2000a: 186; Pym 1998: 117; Ballard 1997; Šarčević 2000; and even Riccardi 1998: 172 for interpreting studies).

Interesting overlaps are found between two useful theoretical frameworks: Göpferich's (2008: 155) model of translation competence and Guilford's (1950) creativity dimensions. Guilford, the "father of creativity research", postulates nine dimensions or abilities in which creative people excel (1950: 451ff): problem-sensitivity, fluency, novelty (originality), flexibility, synthesising ability, analysing ability, reorganizing/redefining ability, complexity/span of ideational structure and evaluation. The prototypical creativity dimensions, however, comprise flexibility, novelty (originality) and fluency. These three dimensions plus a dimension added later, namely *elaboration*, i.e. how well somebody could eventually solve a creativity-demanding task,[2] were selected to form the basis of psychological tests of creativity like the TTCT (*Torrance Tests of Creative Thinking*, see Amabile 1996: 24). The three dimensions were also selected by authors like Thomä (2003) and Burger (1993). The strength of Guilford's framework is that it enables us to assign a large number of translation-relevant creativity indicators to it. Consequently, it can serve to integrate and put into perspective the results of several studies on translational creativity that measure different aspects of creativity. This would seem to be a very useful approach as no study can claim to capture, let alone measure, the entire complexity of creativity. There seems to be some relationship between Guilford's cognitive fluency and Göpferich's

[2] Elaboration is indirectly accounted for in this study through the assessment of the target-text versions.

(2008) translation routine activation competence, which can be seen as the reverse side of the coin of creativity. The ability to switch between a flexible, cognitively demanding problem-solving mode and a more routinised, automatised and eventually reflex-based mode of translation behaviour (henceforth "routine") is in turn considered one aspect of strategic competence in Göpferich's model. It must be stressed here that flexible and routine behaviour are not mutually exclusive. Rather they represent two opposite poles of a continuum in which both forms of behaviour can be present simultaneously in different degrees relative to each other; it is assumed, for instance, that in experts creative behaviour can become routine (see also Kußmaul 2000a: 202) whereas in novices the two forms of behaviour would be more incompatible. Based on all these considerations, translational creativity can now be characterised as a form of creativity that can be traced in a (original) and acceptable translation product with high degrees of flexibility. Ultimately, it should be measured against the background of translational routine. The relationship between translational creativity and routine should ideally give rise to competence-dependent 'translator profiles' that reflect some sort of 'switch competence' between a more creative and effortful problem-solving mode and a more fluent and reflex-like routine mode.

In order to measure translational creativity and routine it is necessary to develop indicators related to these dimensions. In particular, it is deemed important to find indicators that truly refer to the translation as opposed to the quality of the language used. Language-immanent creativity refers to aspects of creativity that apply only to the source text or only to the target text and could well be analysed within a single language system. True *translational* creativity must, however, refer to a quality that can only be found when comparing texts (source text and target text) or to qualities of the transfer process.

2. Creativity dimensions

My assessment of creativity is based on the idea that acceptability and the indicators reflecting the dimensions of novelty, flexibility and fluency (Figure 2) can be measured using a scoring system in which creativity is rewarded by bonus points.

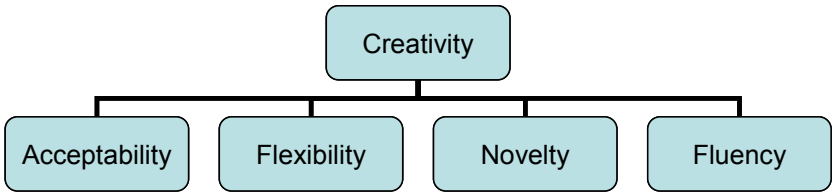

Figure 1. Creativity dimensions selected for assessment procedure

Generally speaking, *acceptability* is defined as skopos-adequacy. By *flexibility* I mainly understand the ability to produce shifts. *Novelty* in my work refers to the uniqueness of the versions produced. *Fluency* (routine) is understood as a set of characteristics that point to a translator's ability to produce versions quickly and in a routinised fashion. These dimensions and the sets of indicators attributed to them are explained in detail below. Precise information about the weight assigned to each indicator will be given in Section 3.

2.1 Acceptability

Translational *acceptability* is assessed in terms of skopos-adequacy. It is defined negatively, namely by the absence of 'translation errors' as judged by three independent raters (see Göpferich *et al.* 2008). For the purposes of my study, translation errors do not comprise errors which are due to a lack of L1 competence such as punctuation, spelling and grammar mistakes, unless they are interference-induced.

The strictest approach to measuring creativity would be to assign zero creativity scores to all erroneous and/or reproductive (i.e. non-creative) translations. Default zero scores are considered inappropriate for the following reason. In a process-oriented approach to translational creativity, it is deemed necessary to focus also on those traces of *emerging* creativity that are present in the translation *process* and can be found in interim versions. This reflects the belief that before opting for a particular final TT unit, translators often experiment with different options, knowing quite well that they have not yet found the optimal solution. This behaviour is even regarded as potentially rewarding from the perspective of creativity research (brainstorming). Consequently, it is considered necessary not only to evaluate translation creativity according to the strictest possible criteria, but also to take into account *traces* of *process creativity* regardless of the

quality of the final product. This process creativity refers to a subject's ability to develop the greatest possible number of different cognitive patterns. Process creativity is thus one form of general problem-solving ability or association competence and is independent from product creativity. It needs to be complemented by the ability to judge the adequacy of translation variants (evaluation competence or ability), another of Guilford's creativity dimensions. Only if a translator's evaluation competence is fully developed, will creativity at the process level give rise to excellent translations. Interestingly, these two abilities (generation and evaluation competence) correspond to what Pym (2003: 489) considers the two central components of translation competence in his 'minimalist approach', namely "[t]he ability to generate a series of more than one viable target text" and "[t]he ability to select only one viable TT from this series, quickly and with justified confidence".

2.2 Flexibility

Flexibility is the core dimension for the measurement of translational creativity. It comprises several indicators, such as cognitive shifts. These indicators are explained in the sections below.

2.2.1 Primary creative shifts

As mentioned earlier, cognitive shifts and non-literalness are two of the most frequently mentioned creativity criteria in translation studies. But how can we measure cognitive shifts? In order to answer this question, Kußmaul's (2000b, 2000c) types of creative translation based on scenes and frames were analysed (Bayer-Hohenwarter 2009a) and it was found that the typology was slightly inhomogeneous and could not be applied to some of the units of analysis in my corpus. Even though Kußmaul's typology was an extremely valuable source of inspiration, it was necessary to develop my own typology of creative shifts. It was assumed that cognitive shifts consist either in making the message conveyed in TT units (or even entire TTs) more abstract or more concrete, or of modifying it in some other way. Moreover, it was assumed that these cognitive shifts would be creative whereas mere reproduction would not, because of the lower cognitive effort involved. Interestingly, insights from cognitive psychology corroborate this assumption, namely Brown's (1958) levels of

categorisation. Investigating the cognitive development of children, Brown found that, when choosing a word for a concept, children tended to pick words from the basic level category (i.e. *dog* and not *animate being*, *animal*, *quadruped*, *Golden Retriever* or *"Sparky"*). Brown found that words belonging to this category are the most commonly and frequently used, the most contextually neutral, with the highest utility, requiring least cognitive effort to process, and that they are easiest to remember and most widely known (see also Lakoff 1987/1990: 13, 31f, 46ff). In order to make these findings applicable to translation, we can argue that any 'literal' or 'form-oriented' translation of a ST roughly corresponds to the basic level category: It requires the least cognitive effort, seems to involve the least risk-taking, is the preferred procedure employed by novices as reported by Zhong (2005: 508) in an empirical study with 21 students at the beginning of their studies, and is, as reported by Englund Dimitrova (2005: 232), the spontaneous reflex to be found not only in novices but also in experts. In their development from novices to experts, translators seem to relive the cognitive development described by Brown. The results of previous research thus confirm the assumption that novices tend to stick to literal and form-oriented solutions and do not contradict my working hypothesis that experts could be more inclined to produce creative shifts.

Starting from these assumptions, the following typology of 'creative shifts' representing 'directions of thinking' was developed:[3]

- abstraction ↑
- modification ↔
- concretisation ↓

Abstraction refers to those cases in which translators use more vague, general or abstract TT solutions as compared with the ST. *Modification* refers to shifts that are considered to be at the same level of abstraction (e.g. express a ST metaphor with a different TT metaphor without the image becoming more abstract or concrete). *Concretisation* refers to

[3] In Bayer-Hohenwarter (2009a), the term *creative procedure* was tentatively used for the same concept.

instances when the TT evokes a more explicit, more detailed and more precise idea or image than the ST.

When applying this classification to a translation, however, the scope of a particular unit of analysis and the criteria that must be met to categorise it as an *abstraction*, *modification* or *concretisation* must be clearly specified before analysing it for creative shifts. This is illustrated by the following example:

> ST1: Did you ever stop to think that the dog is the only animal that doesn't have to work for a living?

It would be possible to analyse (1) how the translators deal with the rhetorical question and (2) how the translators deal with "stop to think" or other units below the sentence level. Here it was decided to analyse the rendering of the rhetorical question because this larger unit of analysis is likely to yield more data. In this particular case, the classification of creative procedures is based on the idea that rendering the ST-rhetorical question by another TT element that is not a rhetorical question is also skopos-adequate:

> TT1/1: Vielleicht haben Sie einmal darüber nachgedacht, dass […]
>
> TT1/2: Es ist eine spannende Überlegung, dass der Hund […]
>
> TT1/3: Der Hund ist wohl das einzige Tier, das […]

TT1 is considered a modification because the question is changed into a statement, but apart from this change in form, the TT wording remains close to the ST wording. TT2 is considered a concretisation because the author's motivation for giving this example is made more explicit. TT3 is an abstraction, because it renders the idea in a more general way. All translations that reproduce the rhetorical question are considered reproductions that do not qualify for a bonus even if they are acceptable. Of course, this does not mean that reproducing the rhetorical question is a bad decision or inevitably results in poor quality; it is simply not creative according to my definition.

As illustrated, two slightly subjective decisions are made when defining the creative shifts for a particular unit of analysis. Firstly, what is the scope of the unit of analysis? And secondly, what instances qualify as abstraction, modification, concretisation and reproduction, i.e. which

classification criteria apply? The decision about the scope of the unit of analysis is guided by the researcher's interest in analysing units that are potentially rich in clear and objective indicators expressing 'creative strength' or 'routine'. Note that more than one way of classification is possible in some cases. However, no difference in 'weight' or 'creative strength' is attributed to the different types of creative shifts. Therefore the slight subjectivity inherent in this classification has no effects on the creativity assessment as long as the creative strength involved in 'reproduction' can clearly be considered lower than that of any of the creative shifts.

2.2.2 Secondary creative shifts

The creative shifts discussed so far are called 'primary shifts'. If we take a look at the following unit of analysis, we find that there is a difference in 'creative strength' between TT2/1 and TT2/2:

ST2: If you stop and pat him, he [the dog] will almost jump out of his skin to show you how much he loves you.

TT2/1: leckt er Sie ab
Primary shift: concretisation (1)
Score: 1

TT2/2: leckt er Sie voll Übermut und Freude ab
Primary shift: concretisation (1)
Secondary shift: explicitation (1)
Score: 2

Both target texts qualify as concretisations according to the criteria defined before the analyses, because the ST metaphor is eliminated and a more concrete picture of the dog's body movements is drawn. In order to pinpoint the difference between the two target texts, the notion 'secondary shift' was introduced. The defining element of TT2/2 can be said to be an explicitation of the dog's emotional state. Sometimes, rhetorical devices, modal particles or other linguistic elements that are only present in the TT appropriately contribute to fulfilling the translation brief and text function by, for instance, intensifying, enriching or explicitating an aspect of meaning.

2.2.3 Fixedness

Translators are sometimes subject to interferences. Here is an example from the TransComp corpus:

ST3: When you get within ten feet of him, he will begin to wag his tail.

ITT3/1:[4] Wenn du innerhalb zehn Schritte [sic] von ihm bist.

TT3/2: Wenn du zehn Schritte von ihm entfernt bist.

In this case, the student translator spent a long time searching for the right word for *within* and even consulted an online dictionary. Through this fixedness on allegedly having to reproduce *within*, she wasted cognitive effort to the detriment of the more important *ten feet*. By rendering *ten feet* with *zehn Schritte* ('ten steps'), the translator again displayed fixedness, this time on *ten*. Generally speaking, fixedness often clouds a translator's view of more relevant issues and leads to a waste of cognitive capacities. For this reason, absence of fixedness is considered a sign of flexibility.

2.2.4 Optional shifts

Optional shifts are TT versions that depart from the linguistic structure of the ST, i.e. are 'non-literal', and are chosen by the translator even if a 'literal' translation would have been acceptable (Kußmaul 2000a):[5]

Example:

ST4: Addiction comes from the Latin word "addicere".

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[4] *ITT* stands for *Intermediate Target Text*.

[5] According to Kußmaul (2000a), the opposite are 'obligatory shifts'. These are changes that the translator is forced to make because of differences between the SL and the TL structure. Kußmaul considers such shifts as creative, but in my view optional shifts are generally more creative than obligatory shifts. If there is no language-immanent constraint to make changes, this is proof of particularly high cognitive effort because it requires problem sensitivity, willingness to take risks, high evaluation competence and the ability to dissociate oneself from the basic-level primacy, i.e. "sticking to the source text". However, the linguistic realisation of optional (and also obligatory) shifts may be more or less creative and need not necessarily qualify as creative shifts.

TT4/1: Das englische Wort für Sucht, addiction, kommt vom lateinischen Wort addicere.

TT4/2: Das englische Wort für Sucht, addiction, stammt vom lateinischen Wort addicere.

TT4/3: Das englische Wort Sucht, addiction, entwickelte sich aus dem lateinischen Wort addicere.

As TT1 can be considered acceptable, TT2 and TT3 qualify as optional shifts and are awarded one bonus point each because these optional shifts are assumed to indicate higher flexibility and cognitive effort and thus more 'creative strength'.

Let us take the example discussed earlier – "Did you ever stop to think". The defined unit of analysis is the rhetorical question. If we focus on a smaller chunk, we can investigate if the translation of *think* is the standard *nachdenken*, which would be fully acceptable, or another derived form of *denken*. If a translator is able to move away from the ST structure and finds an acceptable translation without *nachdenken* or derived forms of *denken*, e.g. "Haben Sie sich jemals überlegt, dass", this can be considered an *optional shift*. The maximum scope of analysis for optional shifts is the unit of analysis; an investigation of smaller chunks is possible if they have been specified before the actual analysis and are taken into account in *all* translations.

2.2.5 Other cognitive processes expressing creative strength

From the large number of other creativity-relevant process indicators that can be defined and would fall into the category 'flexibility', it was decided to select only those which can be clearly measured and appear to be promising in terms of being capable of delivering significant results. To date, the following process indicators seem to show most potential:

1. imagination, e.g. scenic visualisation (see Kußmaul 2005), acoustic imagination (that is when translators try to imagine how a prototypical speaker would express something in a particular situation), or arithmetic imagination (when subjects manage to make a calculation from memory);
2. creative search strategies, e.g. searching for ST synonyms before searching for TT equivalents;

3. questioning the ST as opposed to blind belief in ST authority (see Gilbert *et al.* 1993);
4. situative awareness, e.g. the intention to consult the client for specific information needed and problems with the ST;
5. creative understanding, i.e. understanding words in context as opposed to blind belief in dictionary equivalents.

All these indicators have in common that they express a certain amount of creative strength which goes beyond the bare minimum effort to produce a TT version.

2.3 Novelty

Novelty is a dimension that can, theoretically, be operationalised in many ways, such as the following:

1. By looking at the source of ideas: a translator's own idea would be new whereas a TT element drawn from external sources would not.
2. By looking at novelty in cognitive terms: a creative shift would be new whereas reproduction would not.
3. By comparing the versions produced by different translators: unique or rare translations would be new whereas common translations would not.

For the present study, I have chosen the third way, i.e. measuring novelty in terms of rareness or uniqueness. The second way is also included, but only indirectly since bonus points are awarded for novelty (= creative shifts) as opposed to reproduction within the *flexibility* dimension. It is acknowledged that there are certain overlaps between flexibility and novelty, but the focus of this study is more on obtaining a global creativity score and on the interplay between creativity and routine than in pinpointing the difference between flexibility and novelty.

To determine novelty, all final versions produced for a particular unit of analysis produced by the 12 student and five professional TransComp subjects are compared. A version that occurred only once qualifies as 'unique'; versions that were produced by fewer than 50 % of all subjects qualify as 'rare'.

2.4 Fluency (routine)

According to Guilford (1950: 452), fluency means "producing a large number of ideas per unit of time". When applied to translation, Guilford's fluency seems to correspond primarily to the ability of translators to generate a large number of TT options for a particular ST unit. The most noteworthy attempt to measure translational generativity seems to have been Krings' (1988, 2001) suggestion of a 'variant factor'. When trying to apply Krings' (1988) definition to the TransComp data corpus, it turned out that it was impossible to measure it in an easy, clear and transparent manner. The first of the main reasons for eventually not using the variant factor or similar approaches relying on the count of interim versions is that extensive analyses showed that their existence cannot always be established with certainty and their number not measured clearly. Sometimes, translators only seem to experiment and not produce serious interim versions; sometimes they only produce TT fragments for larger ST units, sometimes TT versions cannot directly be related to particular ST elements and sometimes translators' revisions apply only to minor grammatical or spelling matters. The second drawback of the variant factor is the fact that it does not take into account the influence of the length of the translation unit on the calculation results. For these reasons, it seems, Krings established a new calculation procedure. However, employing this second type of variant factor (2001) was also deemed impracticable because of the highly sophisticated calculation procedure and the lack of transparency of rules for exceptional cases (Krings 2001: 422).

Consequently, the concept of fluency was re-evaluated and significant overlaps with the notion of routine were noticed. The concept of translational routine is known in translation studies, but used mainly in the sense of experienced behaviour at a global level (as in "she has routine in translating operating instructions"). In the present study, routine translational behaviour is understood in the sense of reflexes at the micro-level of translation units and subsumed under Guilford's label "fluency".[6]

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[6] The fact that Guilford defines fluency as "producing a large number of ideas per unit of time" (1950: 452) is not considered contradictory to my operationalisation of

Routine in this sense is behaviour that is highly automatised, as opposed to problem-solving, and measured using the indicators defined in the sections below.

2.4.1 Dwell ratio

The most promising approach to measuring fluency is to establish how long a translator dwells on a particular unit of analysis.[7] This dwell time is measured by counting all the time intervals that a translator spends dealing with a particular unit of analysis, except for those here referred to as 'orientation times'. Such orientation times occur when translators read the ST and/or the TT, for instance in the pre-phase or post-phase, or check if the cohesion between sentences is adequate. I also classify as orientation times any pauses or other events that cannot be related clearly to the unit of analysis in question because they occur exactly between two units. Generally speaking, the time count is thus made according to the strictest possible criteria.

As the dwell time alone is a fairly unreliable measure because some translators, viewed overall, work more slowly than others (e.g. because they have less experience, less self-confidence, a slower typing speed), it was decided to set the dwell time per translation unit in relation to the total translation time. This measure is called 'dwell ratio'. It is a relative measure and not a generally valid performance indicator that could tell us which translator has worked more efficiently. The dwell ratio percentages thus represent *relative* effort in relation to the effort invested in the other translation units in the same experimental text.

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translational fluency (routine). Rather, it is a legitimate extension of the concept that leads to clearly measurable and translation-relevant indicators.

[7] It can be argued that the dwell time may also include idle time and not only productive time and that any cases of idle time should be excluded. However, this is impossible with the methods employed in this study. Only with neuroscientific methods would it perhaps be possible to distinguish between idle time and pauses involving cognitive activity regarding the unit of analysis.

2.4.2 Total translation time

During the TransComp experiments, no time pressure was imposed on the subjects. The total translation time is thus a self-selected period of time. It is an important indicator of translational routine and also the background against which the dwell ratio is measured. Long total translation times reflect little routine, while short total translation times are a sign of more routine.

2.4.3 Automaticity and spontaneity

Automaticity and spontaneity are considered indicators of translational routine that, in the present analyses, only apply to *target texts* but require knowledge of the translator's entire translation process. Automaticity occurs when the ST unit is read and a TT unit produced rapidly, with no further effort spent on the unit. In order to measure rapidity, the three-second rule is used. It is based on the reasoning put forward by Krings (1986: 137), in which unfilled pauses of three seconds or more are taken as a secondary problem indicator because they indicate actual cognitive involvement as opposed to mere (re-)orientation. In practice, the following three criteria must be fulfilled for a translation to qualify as automatic:

1. The analysed TT unit is generated and writing starts within three seconds of the translator's first encounter with the relevant ST unit (except pre-phase, if the ST is only scanned briefly in that phase) *and*
2. the ST or TT unit is not discussed or commented on, and
3. the TT unit becomes the *final* target text.

Automaticity and spontaneity are both indicators of reaction velocity. Whereas automaticity represents the "ideal" case of effortless TT production, spontaneity is desirable but less ideal. Spontaneity refers to the case when translators fail in their first attempt to produce a satisfactory TT but have a "flash of genius" at a later time, when a kind of re-organisation has taken place in their minds. With respect to spontaneity, the three-second rule (criterion 1) thus applies only to a limited extent since translations produced within three seconds of *re-reading* the relevant ST element (as opposed to the first encounter) also qualify as spontaneous. This occurs, for example, after the translator has left a preliminary gap or has produced an unsatisfactory primary equivalent or interim version.

Criterion 2 (no discussion, no comment) does not apply to spontaneity at all; this means that a discussion of the translation unit by the translator, as evident from translation process protocols[8] (TPP), may either precede at an earlier point before the translator resumes work on a particular translation unit or follow at some point after the three-second pause. Criterion 3 (only *final* TT units eligible) applies solely for methodological reasons as it turned out to be impossible to count intermediate translations (see Section 2.4). Only final TTs will thus be analysed for spontaneity.

3. Creativity assessment procedure

The indicators that were assigned to the creativity dimensions in the previous sections can be visualised as shown in Figure 2 below. These indicators are weighted by assigning a different number of bonus points and then grouped to form product and process scores. I define as 'product indicators' all indicators that are found only with target texts and can be analysed without knowledge of the translation process protocols (TPP) or any other process data. I define as 'process indicators' all indicators that apply to intermediate or partial solutions plus indicators that apply to the target texts only but require knowledge of the translation process (e.g. automaticity and spontaneity). Whereas indicators for flexibility are found at the process *and* product levels, the indicators for fluency exclusively belong to the process level and the indicators for novelty, exclusively to the product level.

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[8] *Translation process protocol* refers to the TransComp think-aloud protocols including tags for activities such as typing, scrolling, clicking, etc.

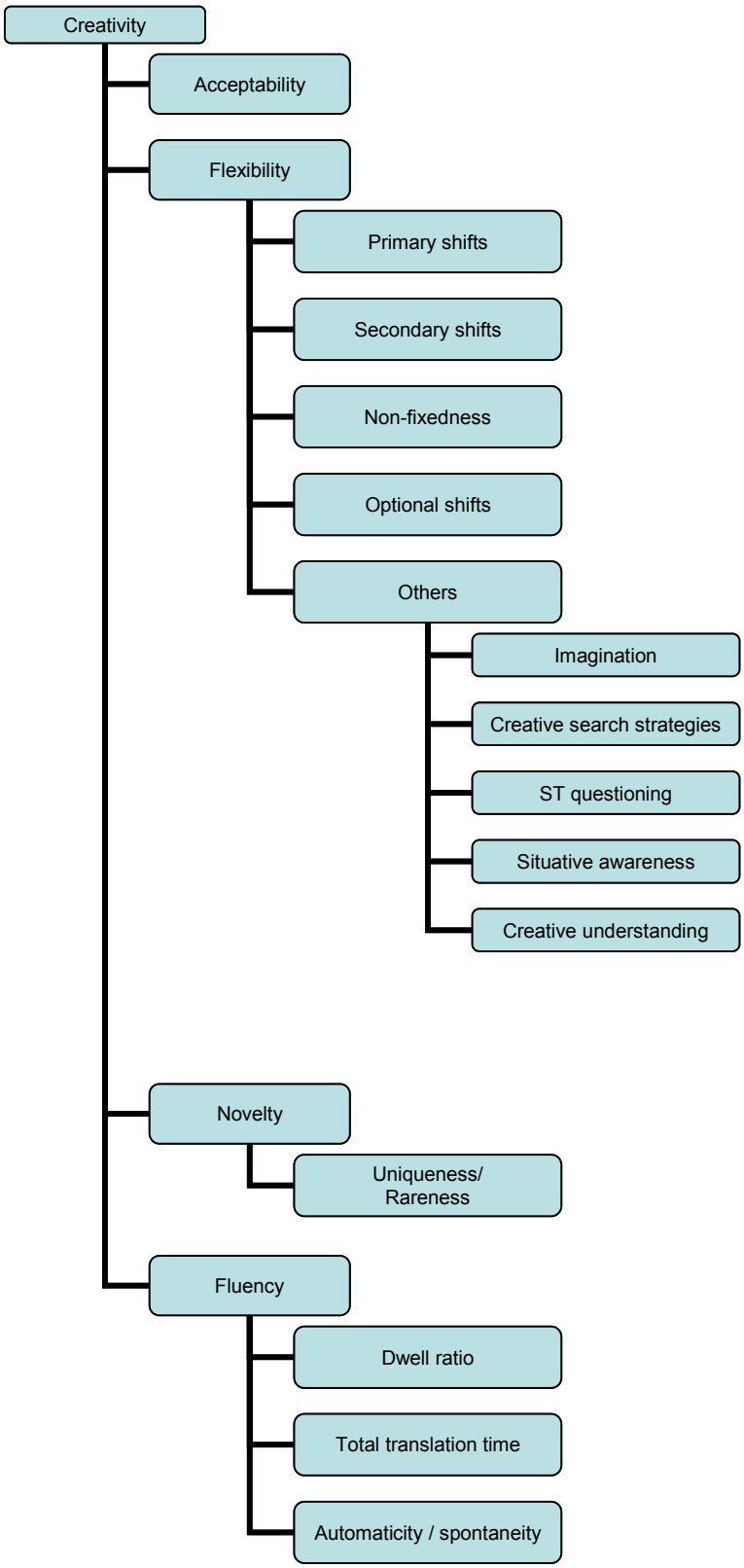


Figure 2. Overview of creativity dimensions and indicators

The following preparations must be made before the scores for product- and process-creativity scores can be calculated:

1. An equal number of units of analysis per experimental text (in my case two creativity-demanding and two routine-demanding) must be selected. In my pilot study, there were no fully objectifiable selection criteria for 'creativity-demanding' versus 'routine-demanding', but I relied on my intuitive judgment drawing on my experience as an interpreter. I am convinced that reference to interpreting can be a useful methodological approach in dealing with issues of time pressure, fluency and routine (see also Bayer-Hohenwarter 2009b for the usefulness of interpreting studies in time pressure research). With creativity-demanding units, I assumed that experienced interpreters would at least hesitate or even apply emergency strategies; with routine units, interpreters would not waste any time. It turned out that my intuitive selection criteria made sense because the creativity-demanding units were perceived as problems by either all or most of the subjects whereas the routine units mostly were not.
2. The criteria for creative shifts, optional shifts and fixedness must be laid down.
3. All TT versions (final and interim) by all translators must be listed.

The next section describes how product creativity is measured.

3.1 Measuring product creativity

Product creativity is the sum of the scores for acceptability, product flexibility and novelty.

To calculate the *acceptability score*, I determine the mistakes and their weight expressed in minus points as they result from the quality assessment procedure (Göpferich *et al.* 2008) for each unit of analysis. Error-free versions gain two bonus points; versions whose number of errors is lower than 50 % of the highest number of errors made by a subject gain one bonus point; versions with a number of errors that is higher than 50 % of the highest error number made by a subject gain no bonus points.

The *score for product flexibility* is obtained by summing up the bonus points earned for creative shifts and for each instance (token) of a

secondary creative shift, optional shift or other cognitive process expressing creative strength. If fixedness, as described in Section 1.1.3, is found in the final TT, one point is subtracted (or, for arithmetic convenience, one bonus point is awarded to all versions *without* fixedness, if a deduction would lead to a negative total score for flexibility).

The *novelty score* comprises two bonus points for unique versions, one bonus point for rare versions (produced by fewer than 50 % of the subjects) and no bonus point for versions produced by more than 50 % of the subjects.

As each unit of analysis has a different potential for flexibility, analysis across subjects and units of analysis would become impossible if one simply added up the absolute number of bonus points. For this reason, the flexibility scores must be transformed into percentages that express the relative difference between the individual values; and, to make addition possible, the same is done with the novelty and acceptability scores. After summing up the percentages for flexibility, novelty and acceptability, the highest value is transformed to 100 % and the lower values are transformed to lower percentages accordingly. This allows for further comparability across subjects, units of analysis and experimental texts. The resulting percentages are called the *product-creativity scores*.

3.2 Measuring process creativity

Process creativity refers to the scores for process flexibility and to the scores for fluency. At least in a first exploratory stage of my project, I work with two types of process-creativity scores: (1) the sum of the scores for process flexibility *and* fluency; (2) only the process-flexibility score. According to the first conception, fluency is a part of creativity as in Guilford's framework; according to the second conception, fluency is a more distinct category that is separated from flexibility and novelty in order to make it possible to take a closer look at the translator's switch competence (see Section 1).

The *fluency score (*or *routine score)* is the sum of the scores for a) the dwell ratio, b) the total translation time and c) automaticity/ spontaneity.

a) With the dwell ratio, high, medium and low values are determined by first establishing the minimum and maximum dwell ratio per translation unit and calculating the time difference. This time range is divided by three. A high dwell ratio corresponds to the highest range of relative time consumption, a low dwell ratio to the lowest range, and so forth. However, a *low* dwell ratio is given a *high* score because it indicates translational routine, a *high* ratio means *low* levels of routine. For this reason, three bonus points are awarded to subjects whose versions were among the third with the shortest dwell ratio, one bonus point to those whose dwell ratio was among the highest third, and two bonus points to those with a medium dwell ratio.
b) For the total translation time, the calculation procedure is analogous to that of the dwell ratio (range divided by three).
c) As for automaticity and spontaneity, automatic solutions are credited with five bonus points. This high number of points is awarded in compensation for the fact that automatic translations leave the translator no opportunity to collect more bonus points in other process categories. Spontaneity is credited with one bonus point.

The *process-flexibility score* is obtained in the same way as the product-flexibility score, except that bonus points can only be earned for interim versions and not for the final versions. For this reason, a bonus is earned only for a creative shift *other than that of the final target text* because the reward for the TT creative shift is included in the product score. Moreover, only one point is awarded even if an abstraction, for instance, appears three times (counting per types, not tokens). The flexibility score is thus higher if the translator proves able to generate *different* creative shifts; this is also seen as evidence of higher cognitive effort than the generation of same-type shifts. It follows that the maximum score that can be reached for primary creative shifts at the process level is three. Every secondary shift earns one bonus for each token; the rules for fixedness and other cognitive processes remain identical to those for the product-flexibility scores. Optional shifts are not counted at the process level (i.e. for interim versions) in line with the afore-mentioned decision not to count interim versions (see Section 2.4).

The procedure for adding up the flexibility score and the fluency score (if applicable) is identical to that for the product-creativity score, i.e.

all values are transformed into percentages with the highest value becoming 100 %. The resulting percentages are called the process-creativity scores (with or without fluency).

3.3 Measuring overall creativity

Generally speaking, overall creativity is the sum of the product-creativity and process-creativity scores. Following the considerations outlined in Section 1.1, I will, at least in a first exploratory stage of my project, apply two different measurement procedures, one reflecting a stricter and one a more lenient approach to weighting the acceptability criterion. In the stricter version, all unacceptable versions (0.5 minus points or more in the quality assessment) lose their product scores and only keep their process scores. In the 'softer' approach, unacceptable versions keep their product scores, which also include the bonus points for acceptability (i.e. one point for a relatively insignificant error) if applicable. In this second case, the only punishment for unacceptability consists in the lower number of bonus points. The overall creativity scores (OCS) resulting from the two measurement approaches are called 'OCS strict' and 'OCS soft'. If one procedure eventually proves to have a clear advantage, the other will be discarded in the final analyses of the remaining experimental texts.

4. Analyses

The applicability of the scoring system was tested on four units of analysis from one experimental text. Two of the units demanded creativity; the other two were routine units. The analysis included the translations by 12 TransComp subjects (5 professionals, 3 third-semester students and 4 first-semester students).

4.1 Assumptions

In this exploratory study, the following assumptions on translational creativity and routine were made:

A1: Higher overall creativity scores will be found with more advanced students and professionals.

A2: Higher creativity scores will result in better translations.

A3: More competent translators will show higher routine scores with routine translation units and higher creativity scores with creativity-demanding units.

A4: If a routine unit is found difficult by a translator, his or her behaviour will be similar to that expected for a creativity-demanding unit.

Although the present corpus is too small to be able to make generalisations, it is expected that these assumptions will not be entirely contradicted.

4.2 Results

All four units of analysis are from a popular-science book on how to win friends (Carnegie 1936/2006). The extract, to be translated from English into German, refers to an analysis of dogs' behaviour whose results are used as a blueprint for how people can make themselves popular. The creativity-demanding ST units selected were:

> "When you get **within ten feet of him**, he [the dog] will begin to wag his tail."

and

> "If you stop and pat him [the dog], he will **almost jump out of his skin** to show you how much he likes you."

The routine-demanding ST units were:

> "You may meet him [the dog] tomorrow **coming down the street**."

> "**Did you ever stop to think** that the dog is the only animal that doesn't have to work for a living?" (see Section 2.2.1)

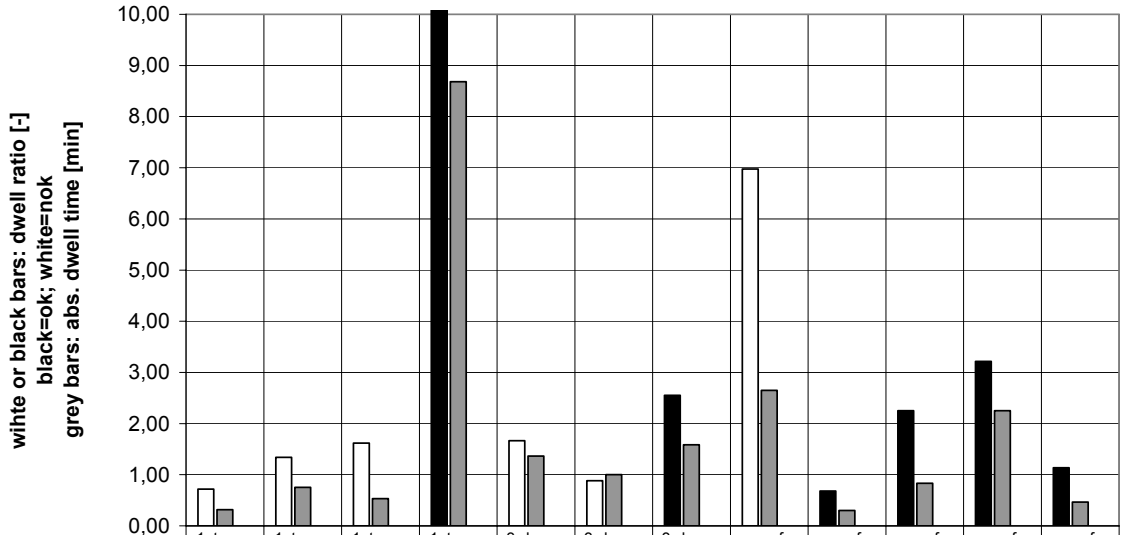
The most important scores for the second creativity unit are given in Table 1. The scores for subjects who produced inadequate target texts are marked in grey.

Table 1. Product, process and overall scores for unit 2 of the creativity-demanding examples; process-creativity measured according to method 1 (including fluency)

Creativity-demanding unit 'jump out of skin'	Semester of study	Process creativity	Product creativity	OCS soft	OCS strict
EVE	1st semester	55 %	18 %	36 %	27 %
JZE	1st semester	64 %	18 %	41 %	32 %
STO	1st semester	55 %	18 %	36 %	27 %
THI	1st semester	55 %	82 %	68 %	68 %
BKR	3rd semester	73 %	89 %	81 %	36 %
KNI	3rd semester	36 %	82 %	59 %	18 %
SFR	3rd semester	55 %	75 %	65 %	65 %
CAS	professional	45 %	75 %	60 %	23 %
FLS	professional	100 %	100 %	100 %	100 %
GEM	professional	64 %	82 %	73 %	73 %
GOB	professional	73 %	93 %	83 %	83 %
RCH	professional	82 %	75 %	78 %	78 %

For most of the six translators who produced inadequate translations (i.e. EVE, STO, KNI, CAS), the process-creativity scores can be considered low. For the first-semester students among them, the product-creativity scores are also very low. For all six, the overall creativity (OC) scores were low. By contrast, the highest overall creativity scores were reached by three professionals (FLS, GOB and RCH) in the strict measurement approach and by two professionals (GOB and FLS) and one novice (THI) in the soft measurement approach. These results confirm assumptions A1 and A2.

Regarding THI's unexpectedly high creativity scores and translation quality, cross-checks will need to show if she is exceptionally gifted or if this result is an exception. Presumably, THI can be considered a statistical outlier and will have to be excluded from some calculations. It is expected, though, that a case-study approach to her data will yield telling results. A glance at the overall creativity scores provides confirmation of the assumption that increasing competence corresponds with increasing overall creativity scores (A1).



	1st sem EVE	1st sem JZE	1st sem STO	1st sem THI	3rd sem BKR	3rd sem KNI	3rd sem SFR	prof CAS	prof FLS	prof GEM	prof GOB	prof RCH
Dwell ratio [-]	0,72	1,34	1,62	11,43	1,67	0,88	2,55	6,97	0,68	2,25	3,21	1,14
Dwell time [min]	0,32	0,75	0,53	8,68	1,37	1,00	1,58	2,65	0,30	0,83	2,25	0,47
Total translation time [min]	44	56	33	76	82	113	62	38	44	37	70	41

Figure 3. Relative time consumption and adequacy for creativity-demanding unit

If we consider some of the indicators for fluency, we can see that THI's excellent result, which is exceptional for a first-semester student, had a high price in terms of time spent. Generally, it is clear that students did not spend considerably more time on this creativity-demanding unit than did professionals, but in contrast to the professionals their translations tended to be inappropriate. Should the students have invested more time (like THI) in order to produce acceptable results? If we take a look at the total translation times (Figure 3), we can see that the first-semester students' values are similar to those of the professionals: the average total translation time for the first-semester students is 52 minutes, for the third-semester students 85 minutes, and for the professionals 46 minutes. This seems to be in accordance with Jääskeläinen's (1996) *developmental hypothesis*, which stipulated that novices tend to translate quickly and produce inappropriate results whereas semi-professionals take longer because of increasing problem-sensitivity. Thus it would appear that students in their first semester lack problem-sensitivity and should have invested more time in translating while students in their third semester seem to have more problem-sensitivity. However, the fact that some of the third-semester students' results are inappropriate, despite their apparent greater problem-sensitivity, shows that they either do not have sufficient problem-solving strategies or lack some other competence. The only inappropriate

translation of a professional (CAS) missed adequacy by 0.5 minus points. As can be seen from CAS' creativity scores, her unacceptable version is not due to lack of creativity but is likely to be caused by inappropriate evaluation or monitoring competence.

Let us now turn to the results for a routine unit:

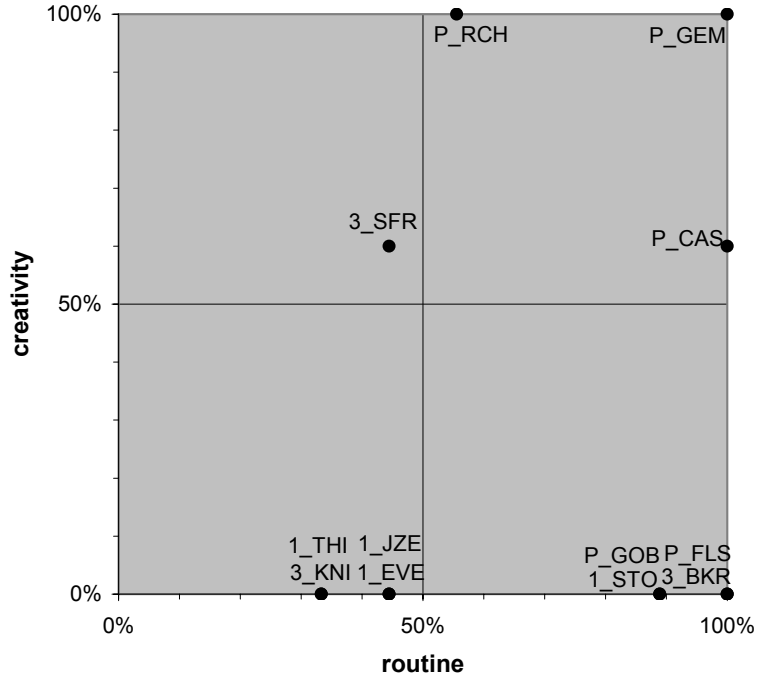


Figure 4. Creativity/routine profile for routine-demanding unit 2 (1 = student at the beginning of first semester; 3 = student at the beginning of third semester; P = professional translator; measurement procedure: OCS strict without fluency)

As expected, the results for this routine unit differ greatly from those for the previous creativity-demanding unit: whereas some students obtained low routine and low creativity scores, all professionals show high routine scores. This provides partial evidence for A3.

Acceptable translations were only produced by SFR, RCH, CAS and GEM; all of these 'good performers' obtained high creativity scores. For this unit, the results of all students except one and the results of two professionals were inadequate. This possibly indicates that most subjects grossly underestimated the difficulty of the translation unit and that another professional (RCH) found the routine unit difficult and had sufficient problem sensitivity to shift from a routine process to a problem-solving process. This finding supports A4. With CAS and GEM 'ideal' professional behaviour is found, i.e. high routine *and* adequate results. This

finding supports A2 and A3 and shows that creativity is also useful with routine units.

The following diagram gives the synopsis of the results for all four units of analysis reported on in this article:

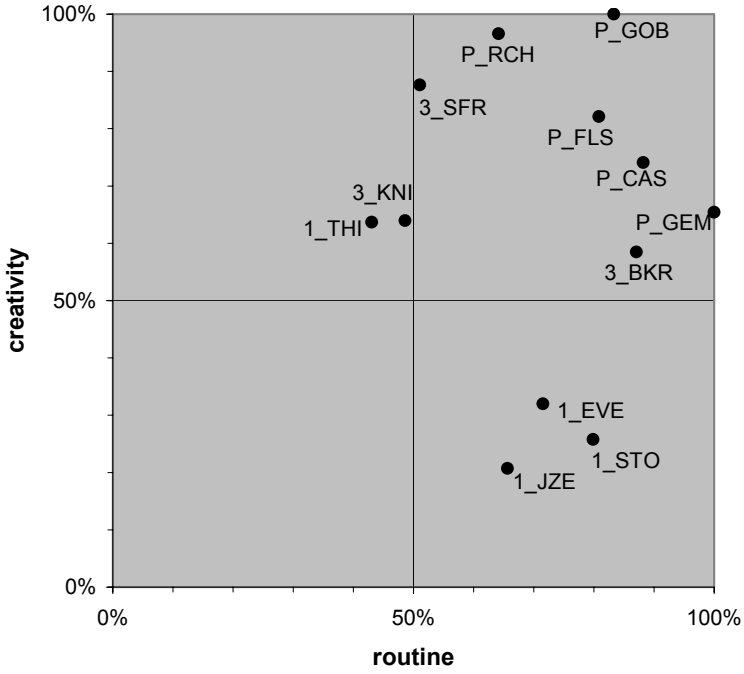


Figure 5. Creativity/routine profile for 2 creativity-demanding and 2 routine-demanding units; measurement procedure: OCS strict without fluency

This cluster diagram shows that the best performers in terms of acceptability (at least three out of four units of analysis acceptable), RCH, SFR, CAS, FLS and GOB, all produced results that can be found in the top-creativity region (in the outmost corner of the first quartile). The third-semester student, SFR, could not apply as much routine as the professionals RCH, CAS and FLS. The worst performers in terms of acceptability (a maximum of one out of four units of analysis acceptable) were STO, EVE and JZE. Their results can all be found in the bottom right corner. This indicates that they applied too much routine and too little creativity. Generally speaking, these results provide evidence for A1 and A2.

Methodologically speaking, a comparison of the results according to the two measurement procedures OCS soft and OCS strict shows relatively slight differences, whereby the general trends for subject categories (e.g. for professionals or first-semester students as opposed to individuals) remained largely unaffected by the calculation procedure. As neither

calculation procedure seems to clearly outweigh the other but the two procedures rather appear to furnish complementary information from different angles, both will be retained at least until the results from a larger corpus provide more evidence.

5. Conclusion and outlook

Despite the modest sample of four units of analysis, the results of the exploratory analyses of translational creativity in 12 translators provide relatively strong evidence for the assumption that higher overall creativity scores are found with more competent translators (A1) and for the assumption that higher creativity scores also result in better translations (A2). Partial evidence has been presented for assumption A3 insofar as more competent translators showed higher routine scores with routine units. As predicted by A4, examples were found for the assumption that shifts in the translation mode (creative problem solving vs. fluent routine translating) can be found in individual cases and that these may point to a subjective perception of difficulty. In addition, it was found that routine poses risks to the acceptability of translations and that creativity is also useful for the translation of routine units. Moreover it emerged that seemingly incongruent results of individual performance at the level of a single unit of analysis sometimes cannot be explained by the factors creativity and routine alone. It must be taken into account that other factors such as lack of evaluation competence, lack of monitoring competence or incongruency between the formal level of competence (e.g. first semester) and the actual level of competence also play a certain role.

In general, the assessment procedure for translational creativity has proved useful and is deemed robust enough to be worth applying to the total of ten experimental texts. As for the measurement procedures, it was decided to retain both because no clear advantages for one procedure were found. The fact that no major divergences in the overall trends could be observed, at least with the sample of four translation units, indicates that the validity of the assessment procedure is fair. It is thus expected that telling results about the *development* of translational creativity, cognitive efficiency and perhaps even cognitive styles will follow. It is also hoped

that some of these findings will point to promising ways of teaching creativity to students of translation and spotting especially gifted students.

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