How to Characterize Professional Gestures to Operate Tacit Know-How Transfer?

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Abstract: Operational knowledge in industries is difficult to capture because of the tacit nature of gestures. Our experiments showed that the operators can be equipped with video capture devices. Professional workers can also be invited to describe the intentions of their gesture. But the bottleneck is in the gesture itself. This paper describes an experiment, which was performed at EDF (Electricité de France), the French leader energy producer company. Several categories of professional gestures were studied and were investigated to produce training video material called "MAP" (Multimedia Apprenticeship Platform). The capture protocol aims to collect operators' intentions, their mental models. An anthropocentric three-step methodology was applied. For all the gestures, six descriptors were used to qualify the environment and the capture situation: (A) the realism of the situation, (B) the length of the gesture, (C) the shooting area size, (D) thought and decision-making of the operator, (E) the operator's ability to gaze available information and (F) the operator's ability to search for information in the environment. A three-value scale is used for each descriptor to quantify the criticism of the gestures. Results include the perimeter of application of the MAP methodology, describing professional gestures which can be captured, formalized and transmitted. The majority of the descriptors have a moderated influence on the process, concentrating their impact on one point of the method. Two parts of the professional gesture have high-level impact on the whole process: (1) the visual component of the gesture to use available information or to search pertinent information in the environment, and (2) the time devoted to interaction between operators or to think and make decision during the realization of the professional gesture.

Keywords: tacit knowledge, video capture, professional gesture, multimedia apprenticeship platform (MAP)

1. Introduction, context

This present work takes place in a knowledge transfer problematic, involving particularities of tacit knowledge (Nonaka & Takeuchi, 1995; Paivio, 1971; Polanyi, 1967) applied to industrial context. In industries, operators perform many technical gestures linked to tacit know-how. The problem to transfer this implicit knowledge was usually solved with implicit transfer technique: the journeyman. This intergenerational transfer needs one to one workers contacts and several months to be achieved. Both conditions are now uncommonly satisfied, and this problem leads industries to solve differently the equation. That was made in *Electricité de France* (EDF, French electrical energy producer), which asked us to develop an operational methodology to capture and to transfer professional gestures.

A usual definition of the gesture considers it as *a form of non-verbal communication, implying necessarily a movement of a part of the body*. There exist gestural codes in any work, in the manners of being, of behaving, of communicating, which are specific to each work environment. The topic of this paper is to approach the professional gesture as a tacit knowledge of industry but it could be approached as a part of an action, implying a communication between operator and machine.

Researches in ergonomics and work psychology on knowledge embodied in gestures impact different sectors of activities: tourism (Sauvage, 1993), automobiles and civil engineering (Chassaing, 2004), rail (Fernandez, 2001), aviation (Aubert, 2000), surgery (Tomás, 2008), etc. This literature doesn't show any consensus about terminology for work gesture analysis: Chassaing (2006) uses the terms "gesture of work," or "gestural knowledge". Clot, *and al.* (Clot, Fernandez, & Scheller, 2007) speak of gesture at work; Aubert (2000) speaks only of "gesture". However, all agree in showing the difficulties to understand the knowledge underlying professional acts by their specificity. Indeed, this knowledge belongs to a class of very special skills, those that are "*encapsulated in the action, hard to verbalize, closely related to the context*" (Leplat, 1990, 1995). We speak of embodied knowledge, that is to say, "*worn and stored by the body*" (Aubert, 2000), which involves all the senses. These are the "skill-based behavior" of Rasmussen (Rasmussen, 1983).

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In the automotive sector, with assembly tasks, and in the civil engineering sector, with tasks of formwork, K. Chassaing (2004) attempts to show the organization of work gestures learned on the job, their development, structure and implementation. Partly reflected by the fetaures of professional skills, she characterizes a work gesture in four points. First, the gesture is a composition: it "*requires a sensory, cognitive and motor activity*". Second, the gesture is invested: it "is *intentional and is oriented toward different goals: to the system, to itself, and to others*". Third, the gesture is situated, "*the work activity [...] is in a situation*". Last, the gesture is built: it "*is the product of a history, of a past, and continues to be expanded*."

The purpose of this research is focused on the capture and transfer of professional knowledge, and not on the study of gesture as such. For this, we use theories of work analysis, but from a quite different perspective from Clot *et al.* Indeed, our observations and analysis focused not on the overall activity of an operator on his job, but on specific segments of his activity selected by the organization and based on: 1) their criticality from the perspective of the organization, and 2) the expertise involved from the operator. These segments are called "professional gestures" by the organization EDF. What is called in common language an operation (e.g. maintenance), a maneuver (e.g. a seal change) or broadly an activity, is called "gesture" by the training professionals because of the strong physical, manual component that covers the job of operators in nuclear power plants.

From our perspective, we define the "professional gesture" as the outward manifestation of an activity segment, carrying expert skills and guided by motives and goals. The notion of segment implies that the duration of this activity is limited in time. Following Russian Activity Theory (Leontiev, 1978; Nosulenko & Rabardel, 2007; Rubinstein, 1940) which is our main intellectual framework, studied gestures are intentional, following a motive, and are determined by a set of goals achieved through actions.

Our work investigates the use of digital video and activity elicitation to give a guideline and operational tools for the capture of knowledge embodied in professional gestures. The operators are equipped with video capture devices. They are also invited to describe the intentions (the goals) of their gesture. But the main problem for this situation is to understand the gesture itself and to know if the gesture can be captured and how. How can it be characterized? Which aspects of the gesture are determinant for a good outside perception? How can we access to the gesture’s cognition? What is the tacit part in a professional gesture?

2. Material and method

This section presents a brief synthesis of the Multimedia Apprenticeship Platform (MAP) construction methodology and an overview of collected gestures. The reader could find more details about the MAP method development in (Le Bellu, 2011; Le Bellu, Lahlou, & Nosulenko, 2010). The MAP is a hierarchically and sequentially structured educational multimedia that allows novices to visualise a mental model of the gesture. It illustrates the gesture in details, with the help of annotated and commented video sequences, schemes, visuals, animations.

2.1 To capture

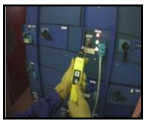
Agreement step

A semi-directive interview brings together the analyst in charge of the MAP creation and an operator. The hierarchy has identified the operator and appointed him for his skills and expertise.

This first stage addresses three objectives: 1) inform the operator of the process to which he/she is committing; 2) arrive at a common mental model of the gesture by asking the operator to mention his/her goals, and 3) collect information that will enable to plan the capture (what, where, who, when).

We present below a set of six professional gestures selected by the EDF training branch for their rare (only a few times performed throughout a career and mastered by a handful of people) and/or critical features (i.e. involving safety, security and/or performance of the company). We add to this set three others gestures performed in different contexts (sportive practice, use of a technical device, maintenance intervention on a car) and chosen for their possible comparison with day life practice. This nine gestures corpus (**Table 1**) constitutes our work material for this study.

Table 1: Corpus of captured gestures

	G1: Remote operation of a tap The tap is controlled via a "button box" that the operator connects to the system after have made the control power cell operational.
	G2: Manual setting of a tap The operator activates a tap high located and controls the adjustments effects on a high dial located at this level.
	G3: Control of a valve tightness After a maintenance operation, the operator controls pressure and parallelism of a valve tightness made by other operators.
	G4: Condenser closure Seal installation and valve closing by calibration and checking of the position of a large condenser horizontally installed.
	G5: Consignment of a pump The operator isolates and drains pumps containing superheated water. A first operator identifies a range of key points and organs to be "consignmented" on a map. A second operator does operations and reports to the first through an informal dialogue phase.
	G6: Round of a safety operator The operator checks the functioning of a site in terms of material, workers, organization...
	G7: Flight simulator switch on The operator is switching on a flight simulator.
	G8: Changing of a flat tire The operator is changing a flat tire on his car.
	G9: Aïkido technique The professor and his assistant show students how to perform an aikido technique called Katate-Dori technique during a training session.

Video recording

The operator wears a subjective camera (subcam) (Lahlou, 1998, 2011) – focused on the operator's activity from his own point of view, and another external camera filming the context of the scene – a hand-held camera and/or a camera on a support. For the purpose of this research, a special subcam was designed to be embedded on the protective helmet of operators working in factory environments (**Figure 1**).

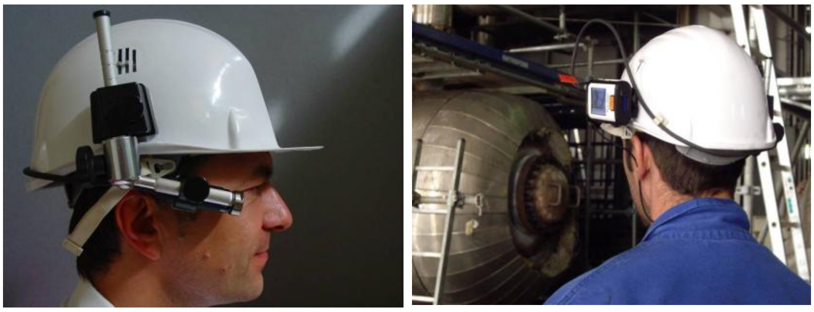


Figure 1: The "hard hat" worksite version of the subcam

There are three moments in the gesture capture step.

1. The just-before time corresponds to the mental preparation. The analyst asks the operator to mimic or perform the gesture. It gives the operator confidence and enables him/her to specify his/her mental model by putting what he/she does into words.

2. The recording step is the moment when the gesture is performed and recorded. The operator must perform the real actions of its gesture in the most possible natural way. In the specific case of a collaborative gesture, each operator wears a subcam. The operator is asked to think aloud, using a goal-directed verbalization protocol (Le Bellu, Lahlou, & Le Blanc, 2009) to collect the operator's intentions. This is done while accompanying each of the goals with explanations answering the following questions: For what reason (why) and in what manner (how) is the gesture performed? *"The operator is freely allowed to consider what is worthy of comment, in regard to the level of sophistication in the breakdown of his/her activity, as well as the moments in time where a specific action begins or ends."* (Le Bellu et al. 2009). Our experiments show that a goal-directed verbalization protocol aims to externalize tacit knowledge and access to the gesture's cognition. With the mental preparation just before, the operator has engaged his knowledge and has prepared his speech. By the way, the inevitable disruption of the gesture is reduced (Ericsson & Simon, 1979, 1984).

3. The just-after video-recording time is dedicated to an "on the spot" debriefing with the operator. Did he run into any problems? What were the specific components of this situation? What does stay the same, what doesn't usually change? By this questions, the analyst tries to access to the intra-individual diversity of the gesture.

2.2 To analyze and to formalize

Analysis: to study data

One analysis of the gesture based on Activity Theory (Leontiev, 1978; Rubinstein, 1940) and Perceived Quality Theory (Nosulenko, 1988a; Nosulenko & Samoylenko, 2001, 2009) is performed in delayed time of the capture. Firstly, the recorded videos are evaluated considering their quality, quantity of information, correspondence to the capture protocol, etc. Secondly, the objective is to plan and to edit a version of a whole video of the gesture performance that puts together subjective and contextual points of view. This video-making must preserve a maximum of information about the gesture to be used as a guideline or the operator's commentary during the next step.

For this analysis work, the analyst uses videos and others materials collected during previous steps. Thus, the analysis leads to develop initial hypotheses about the importance of the different operations and the intentional structure of the gesture according to activity's components: goals, sub-goals, tasks and operations (Leontiev, 1978; Rubinstein, 1940).

Self-confrontation interview: accessing to the subject's subjective experience

The self-confrontation interview method (Theureau, 1992; Von Cranach, 1982) re-immerges the operator in his own activity by confronting him with the recorded gesture. The explanation interview (Vermersch, 1994, 2003), the crossed self-confrontation techniques (Clot, et al., 2001; Mollo & Falzon, 2004) and the re-situ interview (Rix & Biache, 2004) are variations based on the same principle. The variant we are using shares with Cranach's method the fact of resting on the activity theory. Considering our previous practices of different situations (Lahlou, 2010; Nosulenko, et al., 2005; Nosulenko & Samoylenko, 2009), we tend to be a little bit flexible in the formalization of our protocols. The main point is to collect reliable elements to be able to reconstruct the activity. The self-confrontation interview can be made not only with the mobilised operator, but also with another specialist of the considered gesture. This latter modus operandi has the advantage of more easily identifying the components of the knowledge: acquired expertise, lack of experience, practice.Verbal data recorded during that interview enable to emphasise components of the activity within the meaning of Russian activity theory.

Further analysis, final video-making and building of the MAP

Based on data collected during the self-confrontation interview, the analyst changes the first video to be the nearest of the operator's gesture mental model. He can add/delete video parts, add a voiceover, exploit the self-confrontation's soundtrack, add/delete text annotations on the video, adds/removes icons, etc. This further analysis gives rise to a Multimedia Apprenticeship Platform (MAP) is a mode of synthetic representation, which aims to present the most important components of the captured gesture according to the operator's point of view (**Figure 2**).

Figure 2: A gesture presented and described in a Multimedia Apprenticeship Platform (MAP)

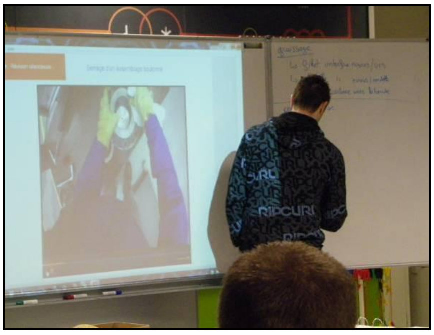


Figure 3: Use of the MAP during a training session

To be validated, the MAP undergoes three levels of validation. The first one is a professional validation, which check if the MAP is consistent with the considered gesture; this is controlled at several times, from the video capture to the pedagogical situation. The second one is an institutional validation, which checks the compliance of the gesture in relation to the institutional repository. The last one is a pedagogical validation: it considers the relevance of educational content carried by the MAP.

After its production, the MAP (**Figure 2**) can be integrated in a training session, as shown in **Figure 3**.

3. Results: A proposition of six descriptors to characterize professional gestures

All of the above professional gestures were included in a process of MAP production. For some of these gestures the progression of the process was easy. It was more difficult for others due to their features. Considering the gesture itself, our field observations lead us to distinguish six descriptors, giving pieces of information for the "MAPpability"[1] of gestures.

We present below each of them by proposing a definition or explanations necessary for other practitioners to understand and apply this analysis/diagnosis grid. The first three descriptors: A, B and C, characterize the performance gesture situation. The last three descriptors: D, E, and F, focus characterization on mental operations linked to information collected by the operator to perform its gesture in good way. Each descriptor has three possible modalities, from the lower level (level 1) to the higher level (level 3).

Realism of the situation

The "*realism* descriptor" represents the degree of spontaneity of the capture situation.

At one pole are the most artificial situations: the action is performed but the result does not really occur (e.g. training exercises); at the other pole, are the most natural situations (e.g. performance of a maintenance gesture in a working power plant).

- Level 1: the situation is re-created. The environment and work situation are simulated outside the natural workplace.
- Level 2: the real situation is prepared. The gesture is produced on the real workplace. Consequences are expected, and can therefore be anticipated.
- Level 3: this is the real life mode. The capture is made on-the-fly, not provided for.

[1] We call « MAPpability of a gesture » the ability to conduct the method of MAP production from start to end. This paper doesn't focus on the method but an overview is given in the section 2. For more details about the MAP process, we refer the reader to (Le Bellu, 2011; Le Bellu, et al., 2010).

Length

The "*length* descriptor" represents the time necessary to perform naturally the gesture without adding verbalization.

A lot of questions exist of the relationship between perceived time and real time. Our observations show that the acceptable length of a film is about eight minutes to obtain a correct usable material. The length of the gesture performance is accentuated by the verbalization. Beyond, the perceived duration by the end-user apprentice is too long. This means that there would be levels of operability that pass through the cutting of a gesture in short sequences of less than ten minutes. Based on real length of natural gestures performances, we distinguished three levels of gestures length. Each level impacts in a positive or negative way the possibility to repeat several times the gesture capture. It is rare to obtain a high quality record at the first time. Our study shows that it is generally necessary the operator to perform his gesture several times. But, due to the gesture's length, it is not always possible.

- Level 1: cases of short gestures (in order of minutes).
- Level 2: gestures of about fifteen minutes. Despite the reproducibility of the gesture, we hesitate to repeat it, due to the time of capture.
- Level 3: gestures that we don't repeat the capture: several decades of minutes.

Perceived time is not only linked to real time; it includes perception of physical or intellectual effort. The longer the duration of the gesture is, the more it affects the ability to concentrate.

Shooting area size

The "*shooting area size* descriptor" addresses the global question of both mobility and granularity (precision) in the gesture.

The gesture can be characterized: rather thin – it implies only fingers or hands movements –, rather wide – it implies large arm movements –, or very wide – it implies all body parts movements and even displacements. The level selected depends on the handling area, and if the involved technical system is or not distributed in space. We noticed that this impacts video quality obtained with the subcam in spite of its wide-angle, and therefore, the shooting area size.

- Level 1: thin. The operator uses only his fingers or arms to realize the gesture. No displacement is required. The operator works in single confined space.
- Level 2: wide. The movement is a part of the gesture. For example, in the G2 gesture, arm movements in height are sustained by the operator. He has no choice, it is a necessary action for the good pursuit and realization of its gesture, but large movements in height, and more generally displacements, are poorly rendered with the subcam. It is necessary to use an external camera to track the movements.
- Level 3: very wide. The gesture is a displacement. We must follow up the operator in a mosaic of places. The gesture of monitoring (G6) illustrates this case very well.

Thought – Decision Making

The "*thought/decision-making* descriptor" tries to give a clue on the degree of the gesture variability[2] according to the necessary thought and decision-making "quantity" for the realization of the gesture. The more it is necessary to think and to make decision during the gesture realization, the more the operator has latitude in the choice of the paths to take to attempt the final goal of the operation. It's typically the case for diagnosis situations in maintenance operations. Therefore, it raises two problems: (1) the problem of capture: is the captured gesture truly "iconic"? And (2) the problem of formalization: how to graphically represent such mental processes in the MAP? And what do we must show: all the possible paths, only the selected path, etc.?

[2] We are conscious that each gesture is unique, even performed by the same operator from one time to the next one. In this descriptor, we consider a high degree of variability whose consequences can modify the outcome of the gesture or whose we don't know the outcome in advance.

- Level 1: the gesture is made only once; it's enough to obtain one "example". The more the environment is controlled (for example, G1 or G2: a procedure application), the closer we approach ordinary gestures.
- Level 2: you have to do the same gesture several times to identify the example. An example is the G5 gesture in which a failure diagnosis is made following a leakage problem and could provide several different consequences.
- Level 3: however multiple instances of the gesture are performed, it can still happen something different. Each case is unique. For example, in the case of a monitoring gesture (G6), there is a procedure to apply (e.g. every day, the scaffolding must be checked, etc.), but the flexibility in the procedure application is huge. Each time, the operator organizes his round as he wishes.

Available information

The "*available information* descriptor" gives the possibility to evaluate the quantity of information rendered available (given) to the operator by external inputs of the environment. We distinguish two types of external inputs: technical and human.

In the first case, these are signals coming from the technical system handled: beeps, sound signals, control or warning lights (**Figure 4**), etc. In the case of human inputs, these are verbal interactions due to communication between operators. More generally, the problem of communication and verbal interactions during the gesture is correlated with the inter-operator collaboration: this is what we call collaborative gesture.

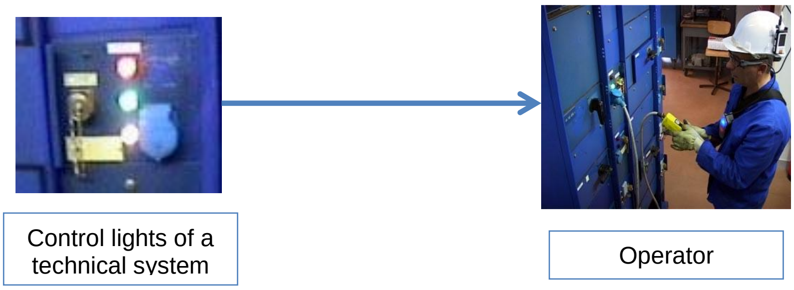


Figure 4: Example of available information given by the system to the operator (G1).

- Level 1: no or few external inputs are given by the system and used by the operator. In gesture cases where there is verbal interaction, this interaction is occasional and can be anticipated before the capture; it is expected in the process. For example, a phone call to report the situation or to make inquiries. By the way, some verbal interactions may be present in a solitary gesture.
- Level 2: in situ and frequent external inputs are given by the system and used by the operator. In gesture cases where there is verbal interaction, the conversation is a part of the gesture and involves necessarily several operators performing the gesture.
- Level 3: the frequency of external signals and/or human interactions (collaborative gesture) is very high and (nearly-) constant. These signals and/or interactions are strongly linked to the activity.

Searched information

The "*searched information* descriptor" gives the possibility to evaluate the quantity of haptic and visual information perceived, collected and embodied (taken) by the operator's body from the environment and the situation. In this searched information process, the operator's sensory-motor loop is activated (**Figure 5**).

It can consist in visual cues: for example, in G3, the operator naked-eye gauges the parallelism of a bolted assembly. In G6, the monitoring activity requires permanent visual cues. Sometimes, touch and physical feeling are also necessary to understand invisible phenomena: for example, always in G3, physical feeling of the torque wrench is very important to know when stopping the tightening because there is no external signal (**Figure 5**).

Captured information is the result of an intentional interaction between the operator and the system. This intention is more or less conscious. One part of this information search process is certainly automated by years of experience. But when it is conscious, contrary to the *available information* descriptor, captured information remains the result of a personal initiative whether spontaneous or learned.

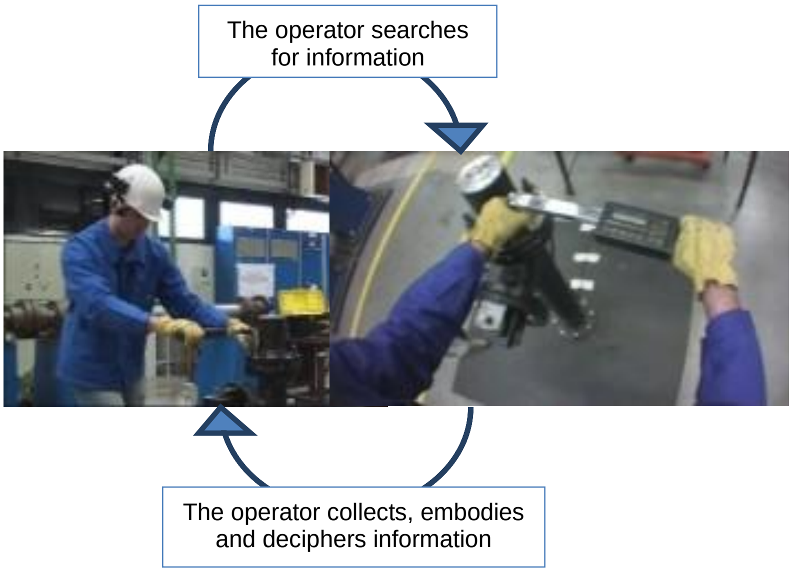


Figure 5: .In a searched information process, the operator's sensory-motor loop is activated. Example extracted from G3

- Level 1: no or few haptic or/and visual information are perceived, collected and embodied (taken) by the operator's body from the environment and the situation.
- Level 2: frequent haptic or/and visual information are perceived, collected and embodied (taken) by the operator's body from the environment and the situation.
- Level 3: the frequency of haptic or/and visual information perceived, collected and embodied is very high and (nearly-)constant.

Figure 6 provides an overview of the studied gestures profiles (G1-G9). Due to the six mentioned descriptors and the three-level scale used for each one, eighteen possible items describe the gestures. All of them were identified in studied situations, most of them several times.

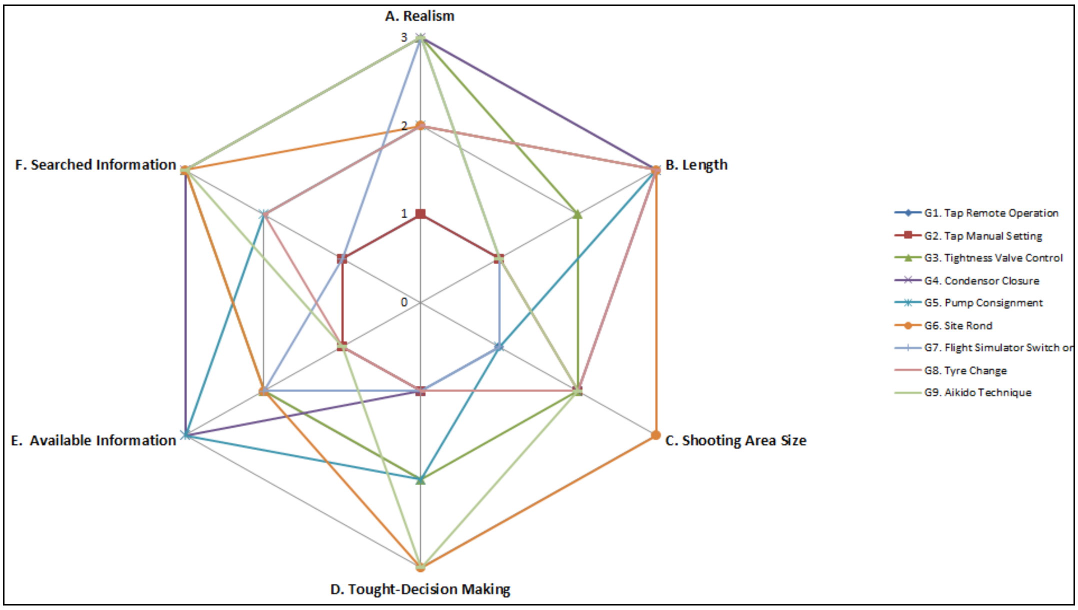


Figure 6: Overview of the captured gestures profiles

Gestures profiles are individually presented in **Figure 7**. Each gesture presents a specific signature symbolized by a radar diagram Gestures with profiles located in the periphery of the diagram, such as G3, G4 and G6 correspond to “complex gestures”. For these gestures, the MAP is difficult to obtain. Those located further inside, such as G1, G2 and G7 are the most MAPpable: these are “simple gestures”. Between these two situations, peripheral and centered profiles, it is recommended to dwell on the reading of descriptors. **Figure 7** shows each of the profiles individually.

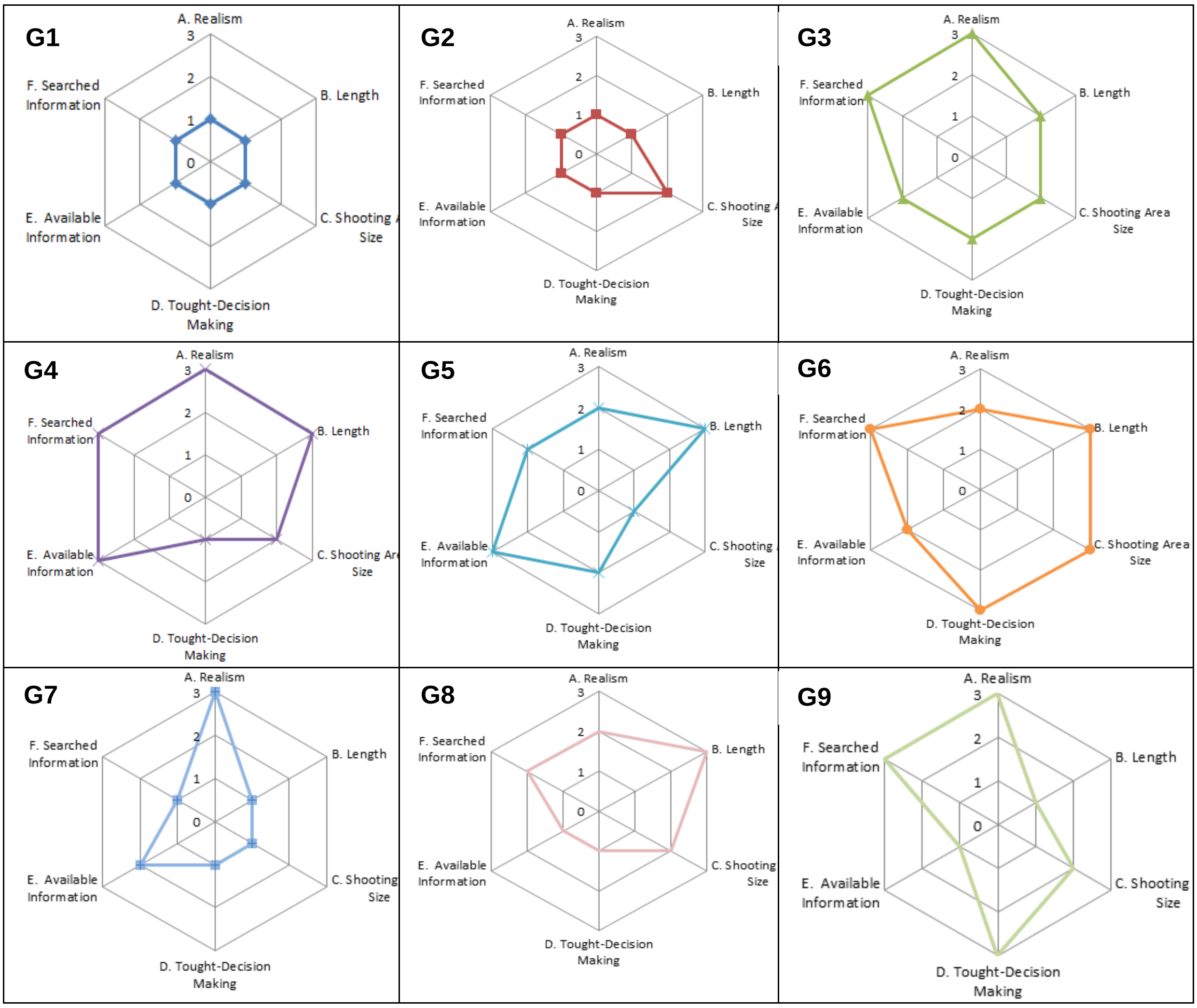


Figure 7: Profiles of captured gestures

4. Discussion, conclusion

Which are the limits for capturing and transmitting professional gestures? This question asks whether all professional gestures can be captured, analyzed, and formalized to be transferred in the form of a Multimedia Apprenticeship Platform (MAP). Our experiments distinguish between simple and complex gestures.

In this work, each of the nine withheld gestures was studied. Six of them are extracted from the corpus of captured EDF professional gestures. Three others complete this collection with gestures that can be found in day-life situations. All of them provide a part of tacit knowledge.

The six proposed descriptors give a pertinent way to approach this tacit part of the embodied knowledge. Three of them gaze the context in which the gesture takes place: (A) the realism of the situation, (B) the length of the gesture, and (C) the size of the area where it is developed. Three others are impacted by the operator: (D) his ability to make decision, (E) his ability to use available information, and (F) his ability to solicit or search for information he can perceive in the environment.

On one hand, there are gestures with small values on their descriptors. Intuitively, they are easy to formalize, because they deal with a “controlled” tacit part. On the other hand, gestures with high values on their descriptors are difficult to formalize: they include large part of tacit knowledge. Then, the profile of each gesture, as shown in **Figure 7**, is a rapid clue to synthesize the tacit component of the embodied knowledge.

To clarify this observation we put values on this overview, translating radar profiles in a quantified position. Because radar profiles deal with polygon’s area, we consider the square of each descriptor's level and make the sum. For G1, the sum is 1+1+1+1+1+1=6; this is the smallest possible value. On the contrary, G6 has the bigger profile's size: the sum is 4+9+9+9+4+9=44, the higher encountered value.

Thus, we obtain small values for G1 (6), G2 (9), and G7 (17). This quantifies our first impression of easy-*MAPpable*-gestures. We obtain big values for G4 (41) and G6 (44). These gestures are regarded as complex cases. Discussion must be focused on the values in between, obtained for G8 (23), G5 (31), G9 (33), and G3 (34). It is helpful to establish three packages of gestures: (1) those with four or more simple values on descriptors; (2) those with either only one or two descriptors with high values, or with a majority of intermediate values; and (3) those with a majority of warning descriptors.

Due to the corpus of the studied gestures, we can appreciate how a specific descriptor is an indicator of embodied tacit knowledge. Our MAP production experience gives us some indications to deal with this question of implicit part of gestures. For example, the size of the shooting area (C) is the only problem encountered in G2 capture, and the realism of situation (A) is quite the only one for G7 capture. For more complex interconnections between descriptors we can retrace a “line of complexity”: impact of length (B) is observable on G8; (B) and available information (E) are observed on G5; (B), (E), (A) descriptors and searched information (F) are present in G4.

Considering the way these descriptors can impact gestures’ capture, it could be possible to define the features of a gesture to capture, in order to isolate a single descriptor. But we did not invest in this too artificial approach which takes distance from the EDF initial problem. The company only needs to capitalize gestures which are rare or critical, from a safety point of view.

Another perspective of discussion is in the fact that all of these features are not equivalent at all. High values on descriptors don’t impact the MAP process in the same way. Each one gives pieces of information on possible difficulties which could occur during a part of the MAP process. It’s a diagnosis tool: gestures’ profiles enable the analyst to anticipate difficulties in the MAP process application.

Descriptors as collaboration or decision-making (D) and motor/visual features of the gesture (F) are involved in determining the complexity of a gesture. High values for these two descriptors imply difficulties to capture, to analyze and to validate the MAP (the three steps of the methodology). High values on other descriptors lead to localized difficulties during the methodology application. Descriptors A (realism of the situation) and C (size of the shooting area) impact the capture phase. Descriptor E (use of available information) mainly impacts the quality of the recorded video as results. Descriptor B (length of the gesture) can impact the analyze phase and/or the video edition phase.

Our work shows that a special attention must be turned to visual component of a gesture (descriptors E and F), and time devoted to collaborative exchange and/or thought or decision-making (descriptor D). These are three important clues to transfer tacit knowledge from expert operators to novices.

This description of professional gestures could be used as a tool to classify other gestures, compare them to encountered cases, and thus ensure they can be transferred. Then, understanding their criticality leads to adapt the method and anticipate ahead difficulties.

This work on the capture of many professional gestures makes the link with the tacit knowledge question and its problems of capture and transmission. Considering operational actions, we obtain an approach of expertise. The limitations of our approach meet the limits of the distanced course with respect to the journeyman approach. Although this work is mainly based on video observation from the expert’s point of view – *to be in the expert’s shoes* (Lahlou, 2011) –, sophisticated psychological theories such as Russian Activity Theory (Leontiev, 1978; Nosulenko & Rabardel, 2007; Rubinstein, 1940) and Perceived Quality Theory (Nadel, 1998; Nosulenko, 1988b; Nosulenko & Samoylenko, 2009) were rendered enough operational to enable the analyst to put forward goals of the operator by verbalization techniques. Our work (Le Bellu, 2011; Le Bellu, et al., 2009) shows it is one possible answer to the embodied tacit knowledge externalization problem (Nonaka & Takeuchi, 1995; Polanyi, 1967).

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