Appropriation from a script theory of guidance perspective: a response to Pierre Tchounikine

Karsten Stegmann[1] · **Ingo Kollar**[2] ·
Armin Weinberger[3] · **Frank Fischer**[1]

Abstract In a recent paper, Pierre Tchounikine has suggested to advance the Script Theory of Guidance (SToG) by addressing the question how learners appropriate collaboration scripts presented to them in learning environments. Tchounikine's main criticism addresses SToG's "internal script configuration principle." This principle states that in any collaboration situation, the learners' set of goals and perceived situational characteristics influence how they dynamically configure internal collaboration scripts. Tchounikine's critique is that SToG is not very clear about how exactly "the learner's set of goals" and particularly "perceived situational characteristics" influence the way learners understand and act in a CSCL situation. In response, we argue that SToG, at its core, is deeply concerned with appropriation of external scripts by focusing on how external scripts influence the (re-)configutration of internal scripts. Here, we lay out different aspects of appropriation in line with the basic assumptions of SToG, namely *perception, interpretation,* and *implementation.* The process of appropriation may be followed by an *internalization* of the result of appropriation (or appropriated external guidance).

✉ Karsten Stegmann
stegmann@lmu.de

Ingo Kollar
ingo.kollar@phil.uni-augsburg.de

Armin Weinberger
a.weinberger@edutech.uni-saarland.de

Frank Fischer
frank.fischer@psy.lmu.de

[1] Ludwig-Maximilians-Universität (LMU), Munich, Germany

[2] Universität Augsburg, Augsburg, Germany

[3] Armin Weinberger, Saarland University, Saarbrücken, Germany

A SToG perspective on appropriation

In a recent paper, Pierre Tchounikine has suggested to further develop the Script Theory of Guidance (SToG) by addressing the question how learners appropriate collaboration scripts presented to them in learning environments. As described by Fischer et al. (2013), SToG is based on (a) a conceptualization of internal script components (play, scenes, scriptlets, roles) that are dynamically (re-)configured in the dynamic memory of an individual learner as a result of being confronted with a certain (learning) situation. Further, SToG is based on (b) a set of principles that offer hypothetical explanations for how internal scripts are built up, how they work, and how they interplay with the external environment (including external collaboration scripts, if they are offered to the learner). In this context, it is important to understand that internal scripts can be of varying degrees of stability. As SToG posits, there are of course situations for which learners may have very limited prior experiences they can draw on. In such situations, SToG assumes that learners select script components from their dynamic memory that have worked in somewhat similar situations in the past. Yet, these internal script components may of course turn out to not work in the current situation, which is why we may expect more re-configurations of internal script components during early phases in which individuals collect experiences with new situations as compared to later phases. Only if the newly combined internal script components repeatedly have helped the individual master a given situation (and multiple similar situations (s) he will go through in the future), will this new in configuration of internal script components gain in stability.

In his article, Tchounikine (2016) focuses on how learners appropriate external collaboration scripts and mainly proposes an extension of SToG towards a further concretization of the "internal script configuration principle." This principle states that "how an internal collaboration script is dynamically configured by a learner from the available components to guide the processing of a given situation, is influenced by the learner's set of goals and by perceived situational characteristics" (Fischer et al. 2013, p. 57 f.). Tchounikine's main criticism towards this principle is that SToG is not very clear about how exactly *the learner's set of goals* and particularly *perceived situational characteristics* influence the way learners understand and act in a CSCL situation. He also argues for a stronger consideration of the role that motivation plays in this context. Indeed, we agree that in the Fischer et al. (2013) article, we were due to limited space not very specific about this question. Thus, we take the opportunity to clarify the mechanisms that we assume to underlie the internal script (re-)configuration process. As we will see, our conceptualization of this process is compatible with Tchounikine's ideas of "appropriation."

How goals influence internal script configuration

With respect to internal aspects that guide internal script configuration, SToG has used the concept of *goals*. We argue that by using this concept, the role that "motivation" plays in the appropriation process is sufficiently addressed. In any situation, be it related to learning or not, individuals pursue a set of goals. These goals can range between long-term goals (e.g., becoming a teacher) and short-term goals (e.g., escaping a boring situation), as well as have a different priority and importance. The short-term goals are influenced by the long-term goals, and by the current situation (including the activated internal script of a learner). The internal script is configured to fit best with the set of short-term goals regarding their priority and

importance. While learning in a CSCL environment, for example, one learner (let us call him "learner A" in the following) may have the short-term goal to come to a joint solution for a given problem in a truly collaborative way (i.e., by everyone expressing his or her arguments, weighing and synthesizing different viewpoints), while another learner ("learner B″ from now on) may have the short-term goal to quickly get the task done with as little effort as possible.

What do these different goals mean with respect to the configuration of these two learners' internal scripts? Let us (hypothetically) assume that both learner A and learner B have internal script components (scenes, scriptlets) available in their dynamic memory that would, in principle, enable them to engage in collaboration on a high level. Let us assume both learners' internal script repertoires include scenes such as "express viewpoints," "develop counterarguments," and "synthesize different viewpoints." They also include scriptlets such as "provide reasons for claims," "search for evidence," or "look for similarities in different points of view and integrate them." In learner A's case, it is very likely that these internal script components will be selected in the given CSCL situation, since they "fit" to the personal and short-term goal of finding a joint solution in a truly collaborative way. In learner B's case, alternative internal script components (that are also part of his dynamic memory and that have proved functional in similar past experiences, i.e. in situations in which these internal script components helped reach the goal "get work done with least possible effort") are likely to be selected. For example, instead of selecting the scene "develop counterarguments," this learner may select a scene such as "agree with learning partner." Similarly, less labor-intense scriptlets may be selected as well. Thus, even though learner B would, in principle, be able to collaborate on a higher level (because higher-level scenes and scriptlets are part of his repertoire), he would not (consciously or unconsciously) select those internal script components. Instead he would replace them with scenes and scriptlets that better fit to his personal short-term goal of getting work done with the least possible effort.

Three things need to be noted with respect to the question how goals influence internal script configurations. First, SToG assumes that internal script configurations can be (and often are) changed on the fly. The same is true for a learner's short-term goals. Learner A is confronted with learner B′s behaviors and verbal contributions, which are connected with goals that differ from his own. So in trying to make sense of the others actions, learner A has to activate this different goal. He may change his goal, possibly modifying it into a similar goal as learner B ("get the work done with as little effort as possible") or in different directions (e.g., "make a good job alone"). Learner B may change his goals as well by trying to make sense of learner A's actions (ideally in the direction of also having the goal "find a solution in a collaborative way," but perhaps in other directions). Once a goal change of this sort has happened, the selection of internal script components for the actions that immediately follow is changed. For example, if learner B – after having noticed that learner A is taking the task seriously and thus having actualized "find a solution in a collaborative way" – he may insert scenes, such as "provide counterarguments" or "synthesize viewpoints," that originally have not been selected (as they did not fit the "get work done with the least possible effort" goal).

Second, the result of the implementation of a certain scene or a scriptlet can also be a goal change. Let's assume that learner A has selected the scriptlet "express own viewpoint," but simultaneously (on the action level), realizes that he has not been clear enough. If he experiences that he is simply not able to bring his point across, the result may be (consciously or unconsciously) the selection of a different goal (e.g., "let learning partner find solution").

Third, goals are additionally influenced by internal (learner-sided) and external (environmental) factors. Internal factors that may influence goal selection (and in a next step, internal script configuration) may be cognitive (e.g., prior knowledge about the task domain),

motivational (e.g., individual interest in the task domain), or emotional (e.g., social anxiety). Yet, the crucial motivational construct we would insist on using for this problem remains to be the "goal" construct: only when a learner's goals change (by whatever reasons or precursors), there is a need of re-configuring currently active internal script components. External factors may be (as Tchounikine has pointed out) the institution and the domain in which learning takes place. Yet, as we will argue in the next section, these external factors do not directly influence goal selection and internal script configuration, but only do so through a process of the individual learner perceiving and processing those environmental features.

How perceived situational characteristics influence internal script configurations

The main point of Tchounikine's contribution refers to the question how external (e.g., situational, institutional) characteristics influence how learners act in a given situation. Mainly, Tchounikine argues that SToG is too unspecific in describing this process. Even more, he points out that the understanding and actions of a given learner is not simply based on the "perception" of situational characteristics, but rather based on a learner's more elaborate "construction" of the situation. In general, then, his criticism seems to refer to the question what is the right term to capture the process of individuals perceiving/interpreting/appropriating their environment.

We agree with Tchounikine that the use of the term "perceive" may be problematic. This is at least true if "perception" is understood as a process that somehow results in a mental copy of the "real world" that surrounds the individual. As psychological research has shown, even basic processes of perception are intricately influenced by individuals' available schemata (and also by motivations and emotions). Yet, of course, such perception processes may also trigger more elaborate interpretation processes. It may happen that an individual finds him or herself in an ambiguous situation for which it seems to be difficult to make sense of. For example, an external collaboration script may include unclear guidance on how to divide the task within a group. In this case, a learner who is confronted with this external script will need to interpret (and perhaps discuss with his learning partners) how to best use the instructions presented in the external script to come to a solution of the problem at hand. He or she will need to find a solution that would "fit" the participating learners' short-term goals to the best possible extent.

In developing SToG, we did not intend to rule out the possibility that there may be situations that require a great deal of information processing ("appropriation" in Tchounikine's terms) on behalf of the individual to analyze the constraints and affordances of the situation. This interpretation/appropriation necessarily includes basic perception processes, but in many cases will also involve more high-level interpretation/appropriation processes. It will also involve discursive processes that will eventually help the learners "make the (external) script theirs" (Tchounikine 2016). Thus, just like Tchounikine, we regard both individual processes *and* social processes (group-level negotiation processes on how to appropriate the script) as crucial for how (groups) of learners interact with the script. Nevertheless, we regard the individual as the gate keeper to the way an external script is appropriated – both individually and by groups. The interpretation/appropriation process through which this happens, again, heavily depends on both the perception of the given situational constraints and affordances. This includes the learning partners' actions, and prior experiences of the individual (s), as well as the actualized motivational, and/or emotional traits and states on the learners' side. In general, then, to avoid conceptual confusion that may be fueled when using the term "perception", we agree with Tchounikine that "appropriation"

might be a better term to describe what is happening when learners are confronted with a certain environment that may or may not include an external collaboration script. At least, we fully agree with Tchounikine when he says "the fact that the most important thing to be considered is not the script (i.e., the instructions and technical features) as perceived by the learner. The most important thing to be considered is what the learner constructs in relation to this perception (and not necessarily from this perception only), which has to do with other aspects than the script, such as crystallized ways of considering/using technology, institutional aspects or domain aspects" (Tchounikine 2016). Tchounikine (2016) elaborates an important aspect here that has been rather implicit in SToG. He actually develops a model of institutional and domain-specific influences that go quite beyond (individual-level) conceptual knowledge and knowledge on how to collaborate. Actually, we have proposed SToG as a theory that integrates traditional cognitive approaches with socio-cultural assumptions. Yet, we agree that the socio-cultural aspects that were delineated in SToG still mostly refered to the individual by saying that what (external) scripts may do is to help individual learners (within groups) develop skills that would help them to immerse in a community. Tchounikine points to the very importance of the opposite direction of the relation between the socio-cultural context and the individual learner: Of course, institutional and domain-specific influences have an influence on how learners appropriate a script (which parts to accept, for example, and which ones to dismiss; or how exactly to understand certain instructions that are provided in an external script). We thus regard Tchounikine's arguments as extremely helpful to make this point a stronger part in the conceptualization of SToG. Also, we propose that future research should try to identify the processes through which institutional and domain-general knowledge on a socio-cultural level become a part of individual's and small groups' appropriation processes.

Considering individual and collective phenomena of collaborative learning

Another important contribution in Tchounikine's paper refers to the relation between individual-level and group-level processes that occur in CSCL. As Tchounikine correctly described, SToG puts the individual learner as "entry point" (Tchounikine 2016) to the analysis of collaborative learning. Thus, one may expect that social and collective phenomena, like, e.g. group cognition (Stahl 2016) or collective knowledge construction (Kimmerle et al. 2015) are beyond the scope of SToG. However, we do believe that SToG has quite a bit to say about this issue. Group and collective phenomena are by definition part of *social practices,* and *the engagement in social activities* play a major role in SToG: social practices are considered to make up a big part of the *situation.*

As pointed out above, we argue that the configuration of enacted internal scripts is influenced by the perceived situational characteristics. While some situational characteristics are rather stable (e.g., the learning task, institutional aspects), others are subject to permanent change. The latter is especially the case for the artefacts created (or not created) by the group members. An off-topic contribution of a learner partner may activate internal script components (either regulation processes with the goal to concentrate on topic again or to deepen the off-topic discussion). Artefacts created (or not created) by learning partners, however, have not only objectively visible features. Learners may also take into account, who produced an artefact (an expert, an attractive person, an opponent) as well as who and how many learning partners supported (e.g., by agreeing) the artefact (cf. hidden profile phenomen; Stasser and Stewart 1992). How the individual interpretation is done is defined by the enacted internal script. But also inactivity of learning partners may cause a re-configuration of the enacted

internal script: If a learner pose a question to her or his learning partners, the configuration of enacted internal scripts may change over time if learning partners do not react. The internal script of the learner comprises the expectation of an answer. If this expectation is not fulfilled, the internal script may re-configure.

While SToG provides a framework to analyse complex dynamics of social interaction in small groups, questions regarding what the outcomes of social practices are, why social practices emerge in the first place, if they are sustained or not, which community goals are served through the activity are not yet well-developed in SToG: For these and related questions on the collective level it may not seem reasonable in any case to start with the individual learner. Hence, Tchounikine (2016) suggested to conceptualize collaboration scripts as a complex system. A future theory that would be aimed at explaining both collective as well as individual phenomena in the context of collaboration scripts might indeed benefit from a complex systems approach (cf. Kimmerle et al. 2015). For the time being, we argue that a complex systems theory may have explanatory power for the dynamics of co-creativity or mass co-construction in Wikipedia in particular, but that limiting the scope of SToG to individual learning activities in social processes may better explain individual outcomes that can be aggregated and compared on the group level (see above).

Steps of appropriation and internalization of external scripts

Tchounikine's main point is that appropriation is key to designing and using external scripts and other forms of technical support for cognitively demanding tasks such as learning. External scripts are typically designed to guide learners to engage in ideal, transactive interaction patterns. These external scripts activate internal scripts that affect learners' activity. This activation is also affected by other situational characteristics and learners' personal goals. This process may be termed appropriation and is in need of a differentiated analysis.

We suggest to take different steps of appropriation into account, namely *perception, interpretation,* and *implementation.* The process of appropriation may be followed by an *internalization* of the result of appropriation (or appropriated external guidance).

Perception Being aware of features of the situation (like components of external scripts) is a prerequisite to subsequent steps of appropriation. Features of situations are differently salient in an environment. The salience of features of situations vary from subtle nudges within the environment, e.g. highlights or graphical re-representations of vital pieces of information without limiting choice of options, to signals that can hardly be ignored and afford actions and decisions (e.g., alarm sound or messages that require confirmation before the activity can continue). The interaction of salience of situational features and the individual's activated internal script components affect to what extent features of the situation are perceived. This includes that learners may actively search for information about specific features, but also that they ignore overt features. The importance of specific features may go unnoticed due to missing or deactivated internal script components (which may, as Tchounikine points out, have also motivational reasons at times). Learners may also perceive features only partially, e. g. they read the instruction "write a counterargument", but they ignore further instructions about how a counterargument is constructed. They might (consciously or unconsciously) assume that they do not need this instruction. This being said, the salience of external guidance is most effective if it is minimal (depending on already available internal script components) to prevent unnecessary cognitive processing of external script information. Minimal salience of

external guidance corresponds with the optimal scripting level principle of the SToG. Building on these elaborations, *hypotheses* can be: the higher the salience of features of a situation, the higher the perception of these features. The better developed an individual's internal script for a situation, the less important is feature salience for the perception of these situation features.

Interpretation The perception of features of the situation is a necessary prerequisite of *interpretation*. A feature of the social situation (like group size or an instruction) needs to be perceived, before this feature can be interpreted. A situation can be more or less specified and respectively, leave more or less room for interpretation. Features of CSCL situations are usually not accompanied by explanations of how to interpret these features. External guidance, however, may provide clear instruction and even examples of how to interpret these features. The extent of support for interpretation may vary between low (e. g., an input box with the title "counterargument") and high (e. g., the very same input box, but with an explanation, of how to construct counterarguments step by step, accompanied by analogous examples). Also, as Tchounikine (2016) rightly argues, "macro" scripts may be regarded as often introducing rather low guidance for interpretation (in terms of lower levels of coercion, which also has to do with the often longer time span they cover), while "micro" scripts would be on the "high guidance for interpretation" end of the spectrum. The support for interpretation may further vary with respect to the script components and goals addressed. In correspondence to the optimal scripting principle in the SToG, the support for interpretation might be as small as possible according to the internal script to prevent unnecessary cognitive processing of explanations and examples. SToG-compatible *hypotheses* on interpretation could be: the higher the support for interpretation, the more similar is the individual's interpretation to the intended interpretation of the features of the situation. Furthermore, the better an individual's internal script for a situation, the less important is the support for interpretation of this situation for the similarity between the individual's interpretation of the features of the situation and the intended interpretation.

Implementation Even if features of a social situation are perceived and interpreted in a way intended by the script designer, implementation of the script by a learner or a group might be sub-optimal or may even fail. According to SToG, this can have two independent reasons: (1) incompatible set of goals and (2) insufficient internal scripts. In case of (1) an incompatible set of goals, learners might be able to realize the requested activity according to the intended script, but this activity is in conflict with other short-term goals. The script, for example, requires to provide a counterargument to learning partner B, but learner A likes partner B very much and does not want to risk offence. Or learner A's short-term goal is to relax and writing a counterargument is assumed to be effortful. In case of (2) insufficient internal scripts, learners' internal script in interaction with an external script allows only to interpret the situation correctly, but the learner is not able to perform the required activity. Learner A may understand that he or she has to provide a counterargument, but does not know how. According to SToG's optimal scripting principle, the scaffolding in this case is not sufficient and would have been more effective if it would have included support on the scriptlet level. Hypotheses deriving from these elaborations on implementation include: the higher the compatibility of the goal set of an individual with the goals corresponding to the intended script implementation, the higher the similarity between intended script implementation and actual script implementation.

Furthermore, the more functional an external collaboration script is for a situation, the higher the similarity between intended script implementation and actual script implementation.

Internalization While appropriation focuses on a single situation, internalization focuses how and under what conditions previous appropriations affect future appropriations. If a learner shows the same (intended) implementation without a specific component of an external collaboration script that was given before, this can be explained by the learner's internal collaboration script. If the learner previously showed a non-intended implementation without support by an external script component, this component of the external script can be regarded as internalized. If a specific appropriation was successful (i.e., led to success regarding the individual goal set), this appropriation will be made with a higher probability in the future. In general, a specific successful appropriation will be shown in a situation with a higher probability if the higher goals and key features of the situation including the interaction of learners match with the situation in which the appropriation was successful in the past. Key features are features that were perceived by the learner and had the same (or similar) value across different situations in which a specific appropriation was successful in the past.

Becoming independent of external guidance through internalization can be supported by feedback and fading-out of external script scaffolds. Fading-out removes specific features of the guidance, while feedback tries to assure that only a certain range of intended implementations is considered as success regarding the individual goal set. Wecker and Fischer (2011) showed that fading-out of scripts can foster internalization of external script components, especially if peers monitored continued implementation. The process of internalization can also be supported by additional reflection on the script and the scripted activities (Rummel and Spada 2007). Although empirical short-term studies yielded discouraging results, too (Rummel et al. 2009), recent long-term studies on scripted learning scenarios show that external collaboration scripts sometimes take effect on internalization only after several weeks (Tsovaltzi et al. 2015). Tchounikine (2016) rightly pointed to the factors of time (between 30 mins and several weeks) and repetition. Internalization may well be a long-term process and sustained through continued, joint practice in an environment enhanced by an external script, in which shared standards of how to interact are being represented. Failure of any external script component to optimally address and activate respective internal script components may thus hamper internalization of that specific external script component.

Conclusion

In contrast to Tchounikine (2016) we argue that SToG, in its core, is deeply concerned with appropriation. However, the degree of elaboration has been low and exemplary hypotheses that can be derived from SToG were missing. Tchounikine (2016) points to several aspects that may shape or influence the process of appropriation. We agree with his claim that time, domain and institution are likely to shape the process of appropriation (including, in our terminology, internalization). External scripts can indeed be regarded didactical contracts with overt and covert clauses that are being appropriated in dependency of the respective internal scripts and context. We suggest a differentiation of steps in appropriation that is consistent with SToG. The factors introduced by Tchounikine (2016) are plausible but empirical evidence is so far sparse. He also suggests a complex systems approach to better understand collaboration scripts

in their complex social, domain and institutional embeddedness. We argue that this is promising but should not be thought of as an extension of SToG because schema theory and complex systems theory do not go well together.

Nevertheless, we argue that one of the strengths of SToG is that it operates on a limited set of concepts and theoretical assumptions, but still is powerful enough to explain a wide range of phenomena. For every new concept or theoretical assumption, a deep elaboration of whether it actually extends the theory is necessary. Yet, as any other theory, SToG should continuously be probed – both by empirical evidence and theoretical considerations as the ones proposed by Tchounikine. Maybe Tchounikine's article can be seen as an invitation to CSCL script researchers to co-develop and co-implement an empirical research program to test SToG, its suggested extensions and its possible complex systems rival theory. This could go quite far beyond the cognitive and the small group level of collaborative learning.

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