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

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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 may (re-)configure 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).

Keywords Script theory of guidance (SToG) · Appropriation · Internal script configuration principle · Optimal scripting principle

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A SToG perspective on appropriation 27

In a recent paper, Pierre Tchounikine has suggested to further develop the Script Theory of 28
Guidance (SToG) by addressing the question how learners appropriate collaboration scripts 29
presented to them in learning environments. As described by Fischer et al. (2013), SToG is 30
based on (a) a conceptualization of internal script components (play, scenes, scriptlets, roles) 31
that are dynamically (re-)configured in the dynamic memory of an individual learner as a result 32
of being confronted with a certain (learning) situation. Further, SToG is based on (b) a set of 33
principles that offer hypothetical explanations for how internal scripts are built up, how they 34
work, and how they interplay with the external environment (including external collaboration 35
scripts, if they are offered to the learner). In this context, it is important to understand that 36
internal scripts can be of varying degrees of stability. As SToG posits, there are of course 37
situations for which learners may have very limited prior experiences they can draw on. In 38
such situations, SToG assumes that learners select script components from their dynamic 39
memory that have worked in somewhat similar situations in the past. Yet, these internal script 40
components may of course turn out to not work in the current situation, which is why we may 41
expect more re-configurations of internal script components during early phases in which 42
individuals collect experiences with new situations as compared to later phases. Only if the 43
newly combined internal script components repeatedly have helped the individual master a 44
given situation (and multiple similar situations (s) he will go through in the future), will this 45
new in configuration of internal script components gain in stability. 46

In his article, Tchounikine (subm.) focuses on how learners appropriate external collabo- 47
ration scripts and mainly proposes an extension of SToG towards a further concretization of 48
the "internal script configuration principle." This principle states that "how an internal 49
collaboration script is dynamically configured by a learner from the available components to 50
guide the processing of a given situation, is influenced by the learner's set of goals and by 51
perceived situational characteristics" (Fischer et al. 2013, p. 57 f.). Tchounikine's main 52
criticism towards this principle is that SToG is not very clear about how exactly *the learner's* 53
set of goals and particularly *perceived situational characteristics* influence the way learners 54
understand and act in a CSCL situation. He also argues for a stronger consideration of the role 55
that motivation plays in this context. Indeed, we agree that in the Fischer et al. (2013) article, 56
we were due to limited space not very specific about this question. Thus, we take the 57
opportunity to clarify the mechanisms that we assume to underlie the internal script (re-)con- 58
figuration process. As we will see, our conceptualization of this process is compatible with 59
Tchounikine's ideas of "appropriation." 60

How goals influence internal script configuration 61

With respect to internal aspects that guide internal script configuration, SToG has used the 62
concept of *goals*. We argue that by using this concept, the role that "motivation" plays in the 63
appropriation process is sufficiently addressed. In any situation, be it related to learning or not, 64
individuals pursue a set of goals. These goals can range between long-term goals (e.g., 65
becoming a teacher) and short-term goals (e.g., escaping a boring situation), as well as have 66
a different priority and importance. The short-term goals are influenced by the long-term goals, 67
and by the current situation (including the activated internal script of a learner). The internal 68
script is configured to fit best with the set of short-term goals regarding their priority and 69
importance. While learning in a CSCL environment, for example, one learner (let us call him 70

"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). 118
Yet, the crucial motivational construct we would insist on using for this problem remains to be 119
the "goal" construct: only when a learner's goals change (by whatever reasons or precursors), 120
there is a need of re-configuring currently active internal script components. External factors 121
may be (as Tchounikine has pointed out) the institution and the domain in which learning takes 122
place. Yet, as we will argue in the next section, these external factors do not directly influence 123
goal selection and internal script configuration, but only do so through a process of the 124
individual learner perceiving and processing those environmental features. 125

How perceived situational characteristics influence internal script configurations 126

The main point of Tchounikine's contribution refers to the question how external (e.g.., 127
situational, institutional) characteristics influence how learners act in a given situation. 128
Mainly, Tchounikine argues that SToG is too unspecific in describing this process. Even more, 129
he points out that the understanding and actions of a given learner is not simply based on the 130
"perception" of situational characteristics, but rather based on a learner's more elaborate 131
"construction" of the situation. In general, then, his criticism seems to refer to the question 132
what is the right term to capture the process of individuals perceiving/interpreting/appropriat- 133
ing their environment. 134

We agree with Tchounikine that the use of the term "perceive" may be problematic. This is 135
at least true if "perception" is understood as a process that somehow results in a mental copy of 136
the "real world" that surrounds the individual. As psychological research has shown, even 137
basic processes of perception are intricately influenced by individuals' available schemata (and 138
also by motivations and emotions). Yet, of course, such perception processes may also trigger 139
more elaborate interpretation processes. It may happen that an individual finds him or herself 140
in an ambiguous situation for which it seems to be difficult to make sense of. For example, an 141
external collaboration script may include unclear guidance on how to divide the task within a 142
group. In this case, a learner who is confronted with this external script will need to interpret 143
(and perhaps discuss with his learning partners) how to best use the instructions presented in 144
the external script to come to a solution of the problem at hand. He or she will need to find a 145
solution that would "fit" the participating learners' short-term goals to the best possible extent. 146

In developing SToG, we did not intend to rule out the possibility that there may be 147
situations that require a great deal of information processing ("appropriation" in 148
Tchounikine's terms) on behalf of the individual to analyze the constraints and affordances 149
of the situation. This interpretation/appropriation necessarily includes basic perception pro- 150
cesses, but in many cases will also involve more high-level interpretation/appropriation 151
processes. It will also involve discursive processes that will eventually help the learners "make 152
the (external) script theirs" (Tchounikine, subm., p. 4). Thus, just like Tchounikine, we regard 153
both individual processes *and* social processes (group-level negotiation processes on how to 154
appropriate the script) as crucial for how (groups) of learners interact with the script. 155
Nevertheless, we regard the individual as the gate keeper to the way an external script is 156
appropriated – both individually and by groups. The interpretation/appropriation process 157
through which this happens, again, heavily depends on both the perception of the given 158
situational constraints and affordances. This includes the learning partners' actions, and prior 159
experiences of the individual (s), as well as the actualized motivational, and/or emotional traits 160
and states on the learners' side. In general, then, to avoid conceptual confusion that may be 161
fueled when using the term "perception", we agree with Tchounikine that "appropriation" 162

might be a better term to describe what is happening when learners are confronted with a 163
certain environment that may or may not include an external collaboration script. At least, we 164
fully agree with Tchounikine when he says "the fact that the most important thing to be 165
considered is not the script (i.e., the instructions and technical features) as perceived by the 166
learner. The most important thing to be considered is what the learner constructs in relation to 167
this perception (and not necessarily from this perception only), which has to do with other 168
aspects than the script, such as crystallized ways of considering/using technology, institutional 169
aspects or domain aspects" (Tchounikine, subm., p. 4). Tchounikine (subm.) elaborates an 170
important aspect here that has been rather implicit in SToG. He actually develops a model of 171
institutional and domain-specific influences that go quite beyond (individual-level) conceptual 172
knowledge and knowledge on how to collaborate. Actually, we have proposed SToG as a 173
theory that integrates traditional cognitive approaches with socio-cultural assumptions. Yet, we 174
agree that the socio-cultural aspects that were delineated in SToG still mostly refered to the 175
individual by saying that what (external) scripts may do is to help individual learners (within 176
groups) develop skills that would help them to immerse in a community. Tchounikine points to 177
the very importance of the opposite direction of the relation between the socio-cultural context 178
and the individual learner: Of course, institutional and domain-specific influences have an 179
influence on how learners appropriate a script (which parts to accept, for example, and which 180
ones to dismiss; or how exactly to understand certain instructions that are provided in an 181
external script). We thus regard Tchounikine's arguments as extremely helpful to make this 182
point a stronger part in the conceptualization of SToG. Also, we propose that future research 183
should try to identify the processes through which institutional and domain-general knowledge 184
on a socio-cultural level become a part of individual's and small groups' appropriation 185
processes. 186

Considering individual and collective phenomena of collaborative learning 187

Another important contribution in Tchounikine's paper refers to the relation between 188
individual-level and group-level processes that occur in CSCL. As Tchounikine correctly 189
described, SToG puts the individual learner as "entry point" (Tchounikine, subm., p. 2) to 190
the analysis of collaborative learning. Thus, one may expect that social and collective 191
phenomena, like, e.g. group cognition (Stahl 2016) or collective knowledge construction 192
(Kimmerle et al. 2015) are beyond the scope of SToG. However, we do believe that SToG 193
has quite a bit to say about this issue. Group and collective phenomena are by definition part of 194
social practices, and *the engagement in social activities* play a major role in SToG: social 195
practices are considered to make up a big part of the *situation.* 196

   As pointed out above, we argue that the configuration of enacted internal scripts is 197
influenced by the perceived situational characteristics. While some situational characteristics 198
are rather stable (e.g., the learning task, institutional aspects), others are subject to permanent 199
change. The latter is especially the case for the artefacts created (or not created) by the group 200
members. An off-topic contribution of a learner partner may activate internal script compo- 201
nents (either regulation processes with the goal to concentrate on topic again or to deepen the 202
off-topic discussion). Artefacts created (or not created) by learning partners, however, have not 203
only objectively visible features. Learners may also take into account, who produced an 204
artefact (an expert, an attractive person, an opponent) as well as who and how many learning 205
partners supported (e.g., by agreeing) the artefact (cf. hidden profile phenomen; Stasser and 206
Stewart 1992). How the individual interpretation is done is defined by the enacted internal 207

script. But also inactivity of learning partners may cause a re-configuration of the enacted 208
internal script: If a learner pose a question to her or his learning partners, the configuration of 209
enacted internal scripts may change over time if learning partners do not react. The internal 210
script of the learner comprises the expectation of an answer. If this expectation is not fulfilled, 211
the internal script may re-configure. 212

While SToG provides a framework to analyse complex dynamics of social interaction in 213
small groups, questions regarding what the outcomes of social practices are, why social 214
practices emerge in the first place, if they are sustained or not, which community goals are 215
served through the activity are not yet well-developed in SToG: For these and related questions 216
on the collective level it may not seem reasonable in any case to start with the individual 217
learner. Hence, Tchounikine (subm.) suggested to conceptualize collaboration scripts as a 218
complex system. A future theory that would be aimed at explaining both collective as well as 219
individual phenomena in the context of collaboration scripts might indeed benefit from a 220
complex systems approach (cf. Kimmerle et al. 2015). For the time being, we argue that a 221
complex systems theory may have explanatory power for the dynamics of co-creativity or 222
mass co-construction in Wikipedia in particular, but that limiting the scope of SToG to 223
individual learning activities in social processes may better explain individual outcomes that 224
can be aggregated and compared on the group level (see above). 225

Steps of appropriation and internalization of external scripts 226

Tchounikine's main point is that appropriation is key to designing and using external scripts 227
and other forms of technical support for cognitively demanding tasks such as learning. 228
External scripts are typically designed to guide learners to engage in ideal, transactive 229
interaction patterns. These external scripts activate internal scripts that affect learners' activity. 230
This activation is also affected by other situational characteristics and learners' personal goals. 231
This process may be termed appropriation and is in need of a differentiated analysis. 232

We suggest to take different steps of appropriation into account, namely *perception,* 233
interpretation, and *implementation.* The process of appropriation may be followed by an 234
internalization of the result of appropriation (or appropriated external guidance). 235

Perception Being aware of features of the situation (like components of external scripts) is a 236
prerequisite to subsequent steps of appropriation. Features of situations are differently salient 237
in an environment. The salience of features of situations vary from subtle nudges within the 238
environment, e.g. highlights or graphical re-representations of vital pieces of information 239
without limiting choice of options, to signals that can hardly be ignored and afford actions 240
and decisions (e.g., alarm sound or messages that require confirmation before the activity can 241
continue). The interaction of salience of situational features and the individual's activated 242
internal script components affect to what extent features of the situation are perceived. This 243
includes that learners may actively search for information about specific features, but also that 244
they ignore overt features. The importance of specific features may go unnoticed due to 245
missing or deactivated internal script components (which may, as Tchounikine points out, 246
have also motivational reasons at times). Learners may also perceive features only partially, e. 247
g. they read the instruction "write a counterargument", but they ignore further instructions 248
about how a counterargument is constructed. They might (consciously or unconsciously) 249
assume that they do not need this instruction. This being said, the salience of external guidance 250
is most effective if it is minimal (depending on already available internal script components) to 251

prevent unnecessary cognitive processing of external script information. Minimal salience of 252
external guidance corresponds with the optimal scripting level principle of the SToG. Building 253
on these elaborations, *hypotheses* can be: the higher the salience of features of a situation, the 254
higher the perception of these features. The better developed an individual's internal script for 255
a situation, the less important is feature salience for the perception of these situation features. 256

Interpretation The perception of features of the situation is a necessary prerequisite of 257
interpretation. A feature of the social situation (like group size or an instruction) needs to 258
be perceived, before this feature can be interpreted. A situation can be more or less 259
specified and respectively, leave more or less room for interpretation. Features of CSCL 260
situations are usually not accompanied by explanations of how to interpret these features. 261
External guidance, however, may provide clear instruction and even examples of how to 262
interpret these features. The extent of support for interpretation may vary between low (e. 263
g., an input box with the title "counterargument") and high (e. g., the very same input 264
box, but with an explanation, of how to construct counterarguments step by step, 265
accompanied by analogous examples). Also, as Tchounikine (subm.) rightly argues, 266
"macro" scripts may be regarded as often introducing rather low guidance for interpreta- 267
tion (in terms of lower levels of coercion, which also has to do with the often longer 268
time span they cover), while "micro" scripts would be on the "high guidance for 269
interpretation" end of the spectrum. The support for interpretation may further vary with 270
respect to the script components and goals addressed. In correspondence to the optimal 271
scripting principle in the SToG, the support for interpretation might be as small as 272
possible according to the internal script to prevent unnecessary cognitive processing of 273
explanations and examples. SToG-compatible *hypotheses* on interpretation could be: the 274
higher the support for interpretation, the more similar is the individual's interpretation to 275
the intended interpretation of the features of the situation. Furthermore, the better an 276
individual's internal script for a situation, the less important is the support for interpre- 277
tation of this situation for the similarity between the individual's interpretation of the 278
features of the situation and the intended interpretation. 279

Implementation Even if features of a social situation are perceived and interpreted in a way 280
intended by the script designer, implementation of the script by a learner or a group might be 281
sub-optimal or may even fail. According to SToG, this can have two independent reasons: (1) 282
incompatible set of goals and (2) insufficient internal scripts. In case of (1) an incompatible set 283
of goals, learners might be able to realize the requested activity according to the intended 284
script, but this activity is in conflict with other short-term goals. The script, for example, 285
requires to provide a counterargument to learning partner B, but learner A likes partner B very 286
much and does not want to risk offence. Or learner A's short-term goal is to relax and writing a 287
counterargument is assumed to be effortful. In case of (2) insufficient internal scripts, learners' 288
internal script in interaction with an external script allows only to interpret the situation 289
correctly, but the learner is not able to perform the required activity. Learner A may understand 290
that he or she has to provide a counterargument, but does not know how. According to SToG's 291
optimal scripting principle, the scaffolding in this case is not sufficient and would have been 292
more effective if it would have included support on the scriptlet level. Hypotheses deriving 293
from these elaborations on implementation include: the higher the compatibility of the goal set 294
of an individual with the goals corresponding to the intended script implementation, the higher 295
the similarity between intended script implementation and actual script implementation. 296

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 (subm.) 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 (subm.) 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 (subm.) 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 (subm.) 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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