

Reasoning with and about Factors in Statutory Interpretation

Michał Araszkiewicz¹[0000–0003–2524–3976], Tomasz Żurek²[0000–0002–9129–3157],
and Błażej Kuźniacki³[0000–0002–3459–7656]

¹ Department of Legal Theory, Faculty of Law and Administration, Jagiellonian University, Kraków, Poland michal.araszkiewicz@uj.edu.pl

² Institute of Computer Science, Maria Curie Skłodowska University, Ul. Akademicka 9, 20-033 Lublin, Poland tomasz.zurek@poczta.umcs.lublin.pl

³ Amsterdam Centre for Tax Law, University of Amsterdam
blazej.kuzniacki@gmail.com

Abstract. The main aim of this paper is to create a semi-formal model of reasoning with cases in statutory interpretation. We introduce the notion of reasoning protocol as a frame for a set of elements used by relevant agents to justify their claims. Our model allows us to represent reasoning not only with factors, but also about the relevance of factors in deciding legal cases on the basis of statutory rules.

Keywords: Case-Based Reasoning · Statutory Interpretation · Factors · Reasoning Protocol · Relevance.

1 Introduction

Hybrid reasoning with rules and cases has been the topic of interest for the AI and Law community for more than two decades now, but it has been mostly investigated in the context of Anglo-American law, which is hardly surprising in the light of the significance of precedent in that particular legal environment [14]. The problems of reasoning with factors in the context of application of statutory law as it is understood in continental legal culture have recently become a subject of interest, also because of the focus of the scientific community on the problems of legal interpretation [16]. In this paper we outline a model of legal reasoning concerning the interpretation of rules by means of factor-based reasoning in the domain of the Polish tax law, which constitutes a good example of rule-based domain rooted in the continental culture of statutory law. We investigate how factors are used to develop statements concerning the interpretation of law, and how a legal interpretation fixed in case law constrains the reasoning of relevant agents for the future, even though no general *stare decisis* principle applies in this context. We develop a notion of Reasoning Protocol – a frame for a set of elements used by relevant agents to justify their claims about

Copyright © 2020 for this paper by its authors. Use permitted under Creative Commons License Attribution 4.0 International (CC BY 4.0).

the solution to legal problems. By using this tool we show on real-life examples how legal problems are solved not by means of comparison of sets of factors, but rather by deciding which factors are relevant in the first place.

The model presented in our paper has a descriptive character which means that we do not introduce any mechanisms of argument creation or acceptance. Instead, we represent in a semi-formal manner the elements of reasoning that were explicitly used in the actual wording of judicial opinions. It should be noted that any loopholes and inconsequences of the parties' reasoning, may cause the same loopholes and inconsequences in their representation, which is the problem we intend not to focus on, taking into account the assumed descriptive perspective.

2 Legal context

According to the Polish tax law, tax is levied on “net income” (dochód), which is a surplus of total gross income (przychód) over the tax-deductible costs (article 7(2) of CITA [1]). The tax law stipulates that all costs incurred for the purpose of obtaining, maintaining, or securing gross income are tax deductible, unless otherwise explicitly provided by law (article 15(1) of [1]). Jurisprudence and tax authorities clarify that there must to be a causal relationship between a cost incurred by a taxpayer and obtaining, maintaining, or securing gross income from a given source of gross income. Thus, in order for a cost incurred by a taxpayer to be a tax deductible cost, the following premises must be met cumulatively: (i) the cost was incurred by the taxpayer; (ii) the cost remains in connection with the business activity conducted by the taxpayer; (iii) the cost is definitive (genuine) in the sense that the cost has not been returned to the taxpayer in any way; (iv) the cost has been properly documented; (v) the cost was incurred to obtain, maintain, or secure a source of gross income; (vi) and the cost is not included in the closed-end catalogue of non-tax deductible costs in article 16(1) of CITA. The conditions (i) to (v) are positive in the sense that they must occur to qualify a cost as tax deductible, while the condition (vi) is negative, meaning that it must not occur to qualify a cost as tax deductible. One of the categories to be found in the catalogue of non-tax deductible costs are representation costs (article 16 (1) (28) of the CITA). In practice it is often doubtful whether a particular cost falls under the category of representation cost.

Therefore, the taxpayer may often be interested to obtain an individual tax ruling (ITR) resolving this problem (Art. 14b of the Tax Ordinance Act [2]). A taxpayer who obtained an individual tax ruling is subject to legal protection in the sense that the ruling contains the standpoint of the tax authorities on the issue indicated in the ruling. An unfavourable individual advance tax ruling might be challenged to the Voivodship Administrative Court (VAC) and subsequently to the court of the second instance (SAC).

3 The basics of the model

Definition 1 (Language) Let \mathcal{L} be a defined language being able to express terms and standard logical and set-theory connectives (\vee, \wedge, \neg, \in , etc.) as well as function symbols.

Definition 2 (Facts) Let $C \subset \mathcal{L}$ be a set of sets of propositions which represent facts.

Definition 3 (Case facts) A set $C_k = \{c_1, \dots, c_n\} \subset C$ is referred to as case facts, that is, the subset of C that constitutes the considered fact situation.

Definition 4 (Factor) Let $F \subset \mathcal{L}$ be a set of propositions representing factors.

By factors we understand propositions referring to elements of the case which provide reasons for a decision for either party. Factors are often referred to as “stereotypical fact patterns” to be distinguished from facts. Factors are binary (they may be present in a given case C_k or not) and if they are present, they always provide a reason for a decision for a given party. Superscripts we will indicate the name of a party whose interest is supported by the existence of a factor.

Similar to [3] we assume that factors may have various levels of abstraction and lower level factors can be a basis of higher level factors’ acceptance.

Definition 5 (Classification statements) By $\text{sat}(\phi, f_j) \in \mathcal{L}$, where $\phi \in (C \cup F)$ we denote that a certain fact or c_i or lower level factor can be classified as factor f_j . Let SAT be a set of all classification statements.

Definition 6 (Legal rule) Let r_i be a legal rule i . Each rule is a pair $r_i = \langle \phi, \psi \rangle$, where ϕ and ψ are a wff of \mathcal{L} . ϕ is a condition of a rule and ψ is a conclusion. By R we denote the set of all rules. By $\text{cond}(r_i)$ and $\text{conc}(r_i)$ we denote respectively condition and conclusion of a rule.

Definition 7 (Agents) Let $IA \in \mathcal{L}$ be a set of propositions representing names of various agents in legal discourse. By $ia_i \in IA$ we denote a given agent i .

Definition 8 (Interpretation) $\bullet \in \mathcal{L}$ is a binary relation word denoting “is interpreted as.” An in-depth discussion of the \bullet functor can be found in [6]

Definition 9 (Interpretive statements) All expressions in the shape $\phi \bullet \psi$ where $\phi \in (F \cup C)$, $\psi = \text{cond}(r_i)$ and $r_i \in R$ will be referred to as interpretive statements.

Definition 10 (Defined relations) Let $REL \in \mathcal{L}$ be a set of defined relations between elements of \mathcal{L} . For example:

- *Strict Incompatibility* – Let α and β be statements of a language \mathcal{L} . The two statements are strict incompatible $\text{SINC}(\alpha, \beta)$ if they are incompatible and while one of them is not accepted, then the second one must be accepted.

- *Conditional sufficiency* – By $SUF(f_x, f_y)$ we denote that factor f_x is, defeasibly, a sufficient condition for adoption of f_y .
- *Irrelevance* – Let f_i be a factor and r_k a legal rule. By $irr(f_i, r_k)$ we denote that factor f_i is explicitly considered as irrelevant to interpretation of rule r_k .
- *Relevance* – Let f_i be a factor and r_k a legal rule. By $rel(f_i, r_k)$ we denote that factor f_i is relevant to interpretation of rule r_k .

Definition 11 (Hypotheticals) $\mathcal{H}(\phi) \in \mathcal{L}$, where ϕ is a wff of \mathcal{L} , reads as “hypothetically, ϕ ”. Intuitively, if an agent makes an expression $\mathcal{H}(\phi)$ this means that the agent poses a hypothesis that ϕ might or may have been the case. The expression $\neg\mathcal{H}(\phi) \in \mathcal{L}$ means that $\mathcal{H}(\phi)$ is rejected. For any $\phi \in \mathcal{L}$, $\neg\mathcal{H}(\phi)$ iff $\neg\phi$.

It is important to note that it is not the aim of this paper to reconstruct a logical model of hypothetical or counterfactual thinking. The operator \mathcal{H} is needed only to distinguish the contexts “ ϕ holds,” expressed simply as ϕ , from the contexts like “ ϕ might have been the case” expressed as $\mathcal{H}(\phi)$.

Definition 12 (Argument) Let A_i^{ia} be an argument created by agent $ia \in IA$. Each argument is a tuple $A_i^{ia} = \langle name, \Phi, \psi \rangle$, where $name \in \mathcal{L}$ is an argument name, Φ is a set of wff of \mathcal{L} , and ψ is wff of \mathcal{L} . Φ is a set premises of an argument, ψ is a conclusion. By ARG we denote the set of all arguments. Intuitively by $A_i^{ia} = \langle name, \Phi, \psi \rangle$, we denote that Φ supports ψ . By $prem(name) \in \mathcal{L}$ we denote the set of premises of argument named $name$, by $concl(name) \in \mathcal{L}$, and $author(name) \in \mathcal{L}$ we will denote functions returning conclusion and author of argument A_i^{ia} : if $A_i^{ia} = \langle name, \Phi, \psi \rangle$, then $prem(name) = \Phi$, $concl(name) = \psi$, and $author(name) = ia$.

Definition 13 (Reasoning protocol) Let $PROT_{ia} = \langle name, Cl, Rs, Cf, Rf, Rel, Cs, Sf, Is, Carg, Conc \rangle$ be a 11-tuple representing of reasoning protocol of agent ia , where:

0. $name \in \mathcal{L}$ – is a name of the protocol;
1. $Cl \in \mathcal{L}$ – is a claim which agent ia is going to prove;
2. $Rs \subseteq R$ – is a set of legal rules which agent ia needs to prove the claim;
3. $Cf \subset C$ – is a set of case facts (actual state of affairs);
4. $RRel \subset F$ – is a set of relevance relations of two kinds: $rel(f_i, r_k)$ and $irr(f_i, r_k)$;
5. $ORel \subset \mathcal{L}$ – is a set of other defined relations between factors (for example incompatibility or strict incompatibility relations) which are relevant to the case. We assume that in $ORel$ can be used factors which are in the relations from set $RRel$;
6. $Cs \subset \mathcal{L}$ – is a set of adopted classification statements;
7. $Sf \subset F$ – is a set of satisfied factors i.e. factors which can be accepted (on the basis of Cf);
8. Is – is a set of adopted interpretive statements;

9. $Carg \subset ARG$ – is a set of subsumption arguments, i.e. arguments necessary to support the conditional part of a legal rule;
10. $Conc \in \mathcal{L}$ – is a final conclusion, in most cases $Conc = Cl$.

Additionally we assume a set of functions returning particular sets of elements of a protocol. For example, function $Cl(name) \in \mathcal{L}$ returns claim of protocol named *name*.

Definition 14 (Case) Let $CASE_i \subset \mathcal{L}$ be a case *i* represented by a set of names of reasoning protocols used in the case. We assume that protocols in the case are ordered. Let $OCASE_i \subset \mathcal{L}$ be a partial order of elements of $CASE_i$. The order of protocols represents the power of the authors of particular reasoning protocols over other authors. For example, a claim of tax authority (and its arguments) is stronger than a claim of taxpayer; decision of a Court is stronger than a claim of tax authority, etc. By *CASE* we denote the set of all cases.

The representation of a case is a key point of our model. The output of a previous case includes not only the factors, rules and final decision, but also the more extensive information represented in Reasoning Protocols. In a new case, the Court, can construct an argument not only on the basis of the final decision, but also on the basis of the mechanisms used in arguments justifying a previous decisions.

4 The case

We use the model outlined in the previous section to represent the reasoning of relevant agents in two cases, namely, the judgment of 7 judges panel of the SAC of 17 June 2013 (II FSK 702/11, hereafter: Judgment 1) and the judgment of the VAC of Rzeszów of 23 October 2018 (I SA/Rz 741/18, hereafter: Judgment 2). Judgment 1 is particularly interesting because the SAC expressed an opinion on the appropriate interpretation of the statutory rule concerning the costs of representation. The modelling of Judgment 2 shows how the preceding decision practically constrains the legal reasoning of relevant agents even though no *stare decisis* principle is applicable in this context.

Judgment 1

The legal context for the case is provided by the statutory rule r1, based on art. 16.1.28 of the CITA as discussed above in Section 2:

cond(r1) = representation_costs_including_costs_related_to_purchase_of_catering_services_or_food_or_beverages_including_alcoholic_ones
conc(r1) = not_tax – deductible_costs

In the case that gave grounds for Judgment 1, the agent taxpayer (TP) was interested to obtain an ITR to the effect that the costs incurred by TP are not representation costs (the positive conditions of tax-deductible costs were assumed to be met). In the motion for ITR, TP outlined a hypothetical case C1 comprising the facts that TP, being a company, organizes business meetings with its (potential) contractors and incurs the purchase of catering services. The significant catering expenses are incurred when meetings take place in restaurants,

so the significant facts may be presented as follows:

$C1 = \{c1, c2\}$ where $c1 = \textit{business_meetings_in_restaurants}$,

$c2 = \textit{taxpayer_incurs_catering_expenses}$ During the time the motion of ITR was filed, the case law, concerning what factors should be considered in the process of qualification of a given cost as an instance of representation cost, was unstable. This state of affairs gave rise to proceedings before the Tax Authority, The Voivodeship Administrative Court and the Supreme Administrative Court, which eventually referred the case to be decided by the grand jury (7 judges panel).

The SAC was considering whether the legal rule $r1$ (category Rs) should be applicable to the presented case facts (Cf). Unlike in the previous case law (which we do not discuss here because of space limitations), the SAC stated the factor relevant for deciding whether a given cost is a representation cost: the exclusive or main goal of this cost must be the building of image by the taxpayer. If this factor is not met, the tax authorities should assume that the cost was met for business purposes (provided that the positive conditions of tax deductibility were met, which was assumed in the present case). In a given case SAC recognizes two relevant factors: $f_1 = \textit{image_building_exclusive_or_main_purpose}^{TA}$ and $f_2 = \textit{business_purpose}^{TP}$, while category ($ORel$) defines the strict incompatibility relation between them. In the context of the case facts the court held that the factor f_1 should not be considered to apply only because the meetings took place in restaurants or because they involved the purchase of catering. The adoption of f_1 as the only factor relevant for the interpretation of the rule condition imposes a degree of argumentative burden on tax authorities: it is difficult to sufficiently argue that the cost of image building as its exclusive or main goal. The interpretive standards adopted by the SAC, in particular in judgments enacted by the grand jury, are practically difficult to challenge, taking into account that if properly complained, the future case will eventually be heard by the SAC. The Reasoning Protocol of the SAC ($SAC_judg1 \in CASE_{SAC_judg1}$) may be presented as follows.

Category	Content
name	SAC_judg1
C1	$\neg conc(r1)$
Rs	$r1$
Cf	$C1 = \{c1, c2\}$
RRel	$rel(f_1, r1), rel(f_2, r1)$
ORel	$SINC(f_1, f_2)$
Cs	$S1 = \neg sat(C1, f_1), S2 = sat(C1, f_2)$
Sf	f_2
Is	$IS1 = f_1 \bullet cond(r1)$
Carg	$A_1^{sac} = \langle a1, \{IS1, \neg f_1, f_2\}, \neg cond(r1) \rangle$
Conc	$\neg conc(r1)$

Judgment 2

In the fact situation that gave rise to the issuance of Judgment 2, the TP applied for an ITR concerning the following circumstances: the TP acting as a

company (employer) organizes integration events both for its workers employed on the basis of employment contract and for its B2B contractors. The organization of the integration events requires purchase of catering services for the participants. The TP argues that such costs do not amount to representation costs. However, the TA disagreed with the TP with regard to the costs related to participation of B2B contractors on the basis that they are actually third parties. The set of relevant case facts includes one element: $C2 = \{c3\}$, $c3 = \textit{integration_events_for_B2B_contractors}$

Category	Content
name	TP_judg2
Cl	$\neg conc(r1)$
Rs	$r1$
Cf	$C2$
RRel	$rel(f_1, r1), rel(f_2, r1)$
ORel	$SINC(f_1, f_2)$
Cs	$S3 = \neg sat(C2, f_1),$
Sf	f_2
Is	$IS1 = f_1 \bullet cond(r1)$
Carg	$A_2^{tp} = \langle a2, \{IS1, \neg f_1, f_2\}, \neg cond(r1) \rangle$
Conc	$\neg conc(r1)$

As we can easily ascertain, the TP followed strictly the Reasoning Protocol employed by the SAC in Judgment 1. Obviously, the case facts that gave rise for the motion for the ITR were different, but the TP adopted relevant factors ($RRel$) and the defined relation ($ORel$) in accordance with the Reasoning Protocol SAC.II FSK 702/11. The TA basically followed the Reasoning Protocol designed by the SAC in the II FSK 702/11 case (Judgment 1) because it adopted the same interpretive statement and it also did not reject any of the factors accepted by the SAC. However, the TA also added an additional factor and additional relation between factors. The TA conceded that the B2B contractors are third parties with regard to TP, and that the existence of such a factor implies the existence of the factor f_4 , that is, if the newly designed factor is satisfied, the f_4 factor is also satisfied. The factor designed by the TA may be represented as follows: $f_{1.1} = \textit{costs_incurred_for_the_third_party}^{TA}$

Since the factor $f_{1.1}$ is attached to f_1 as an immediate lower-level factor, there is a relation $SUF(f_{1.1}, f_1)$ between them. The Reasoning Protocol of the TA:

Category	Content
name	TA_judg2
Cl	$conc(r1)$
Rs	$r1$
Cf	$C2$
RRel	$rel(f_1, r1), rel(f_2, r1), rel(f_{1.1}, r1)$
Orel	$SINC(f_1, f_2), SUF(f_{1.1}, f_1)$
Cf	$S4 = sat(C2, f_{1.1}), S5 = sat(f_{1.1}, f_1),$
Fs	$f_{1.1}, f_1$
Is	$IS1 = f_1 \bullet cond(r1)$
Carg	$A_3^{ta} = \langle a3, \{IS3, f_{1.1}, f_1\}, cond(r1) \rangle$
Conc	$conc(r1)$

As we can see, the TA did not delete any information from the categories $RRel$, $Orel$, or Is from Reasoning Protocol as designed by the SAC in Judgment 1, but instead attempted to develop it by establishing a new factor $f_{1.1}$ understood as a sufficient condition for adoption of f_1 .

The TP filed a complaint to the VAC. The VAC agreed with the TP and applied legal meta-reasoning by pointing out that the TA had introduced an inappropriate standard. The Reasoning Protocol developed by the VAC was identical to the one employed by the TP, so instead of repeating it here, let us reconstruct the meta-argument based on the discrepancy of the Reasoning Protocol the TA was supposed to use and the Reasoning Protocol it actually used.

Category	Content
name	VAC_judg2
Cl	$\neg conc(r1)$
Rs	$r1$
Cf	$C2$
RRel	$rel(f_1, r1), rel(f_2, r1), irr(f_{1.1}, r1)$
Orel	$SINC(f_1, f_2)$
Cf	$S6 = \neg sat(C2, f_1), S7 = sat(C1, f_{1.1}),$
Fs	f_2
Is	$IS1 = f_1 \bullet cond(r1)$
Carg	$A_4^{vac} = \langle a4, \{\mathcal{H}(rel(f_{1.1}, f_1) \in RRel(SAC_judg1))\},$ $S7 \in Cs(SAC_judg1) \rangle$ $A_5^{vac} = \langle a5, \{\neg(S7 \in Cs(SAC_judg1)),$ $inc(\neg(S7 \in Cs(SAC_judg1)), \mathcal{H}(rel(f_{1.1}, f_1) \in RRel(SAC_judg1))\},$ $-\mathcal{H}(rel(f_{1.1}, f_1) \in RRel(SAC_judg1))$ $A_6^{vac} = \langle a6, \{-\mathcal{H}(rel(f_{1.1}, f_1) \in RRel(SAC_judg1))\},$ $\neg(rel(f_{1.1}, r1) \in RRel(SAC_judg1)) \rangle$ $A_7^{vac} = \langle a7, \{\neg rel(f_{1.1}, r1) \in RRel(SAC_judg1)\}, irr(f_{1.1}, r1) \rangle$ $A_8^{vac} = \langle a8, \{irr(f_{1.1}, r1), f_{1.1} \in prem(a3), r1 \in Rs(TA_judg2),$ $a3 \in Carg(TA_judg2)\}, \neg a3 \rangle$ $A_9^{vac} = \langle a9, \{IS1, \neg f_1, f_2\}, \neg cond(r1) \rangle$
Conc	$\neg conc(r1)$

The VAC basically agreed with the TP and disregarded the reasoning of the TA,

which led to avoiding of the ITR provided by the latter agent. One can notice that TA did not go straightforwardly against the Reasoning Protocol designed by the SAC, but added new elements to its arguments (factor $f_{1.1}$, the relation $SUF(f_{1.1}, f_1)$), effectively narrowing the scope of tax-deductible costs. On the first sight, such an extension of the set of relevant elements was not precluded by the SAC. The VAC provided an additional argument for its position by using the SAC's opinion to justify that the Reasoning Protocol developed by the TA was fallacious. The argument of the VAC is based on hypothetical reasoning. First, the VAC indicates that if the SAC considered $f_{1.1}$ to be a relevant factor for interpretation of the rule $r1$, it would also have held that the factor $f_{1.1}$ was satisfied by the case $C1$, because obviously, the meetings in restaurants in $C1$ were organized for third parties ($a4$). Because, such a classification statement was not recognized by the SAC, the hypothetical statement that the $f_{1.1}$ would be the relevant factor should be falsified ($a5$). On this basis, the VAC drew an explicit conclusion that the factor $f_{1.1}$ is not relevant for the interpretation of the rule ($a6$) and therefore it is irrelevant in this context ($a7$). The argument $a7$ attacks one of the premises of the TA's argument $a3$, which invalidates the latter agent's reasoning.

The set $CASE_{judg2} = \{TP_judg2, TA_judg2, VAC_{judg2}\}$ contains all reasoning protocols of all parties which take part in the discourse. Both TP_judg2 and VAC_{judg2} have the same conclusion ($\neg cond(r1)$), which is in conflict with the conclusion of TA_judg2 ($cond(r1)$). We also assume that the Court has power over both parties which can be represented by order $OCASE_{judg2} = (VAC_{judg2} > TP_judg2), (VAC_{judg2} > TA_judg2)$, thanks to which the Court's conclusion prevails over the conclusion of the Tax Authority.

5 Discussion

This paper has two main contributions. The first one is the development of the notion of Reasoning Protocol and the second one is the investigation of selected patterns of case-based judicial reasoning in the context of statutory interpretation as it is understood in continental legal culture. We investigated cases where not only factors played a role in forming interpretive sentences, but also where reasoning about the relevance of factor played a pivotal role in judicial reasoning. The Reasoning Protocol is a tool for descriptive systematization of legal reasoning. It does not aim, *per se*, to be a computational model of legal argument, but rather a means to systematize the elements of reasoning explicitly used in the text of judicial opinions. Therefore, it is designed first and foremost to study past decisions and to systematize knowledge about the reasoning patterns used in legal practice, not only by courts, but also by other agents whose reasoning is reported in judicial opinions. The Reasoning Protocol is designed to represent incomplete, enthymematic reasoning. However, it may serve as a starting point for reconstruction of premises that are further used to feed computational models of legal reasoning. The second contribution of the paper is the investigation into the structure of reasoning with cases in the continental legal culture environment.

Whilst the problem of justifying legal interpretation with different classes of arguments (linguistic, systemic, and functional) has already earned considerable attention from the AI and Law community, the role of factor-based reasoning in this context, analyzed from the descriptive point of view, has remained neglected. In this contribution we have purposefully focused on the problem how the determination of factors in a landmark case (Judgment 1) influenced the reasoning in a following case (Judgment 2). We have investigated how the Tax Authority attempted to narrow the scope of interpretation of the notion of tax-deductible costs by introducing new elements to the Reasoning Protocol content fixed by the SAC, and how the VAC criticized this attempt by constructing and applying a complex hypothetical argument. The analysis reveals important parallelism between common-law case-based reasoning on the one hand and civil law case-based reasoning on the other hand. In both contexts (1) hypothetical reasoning is important in the context of case-based reasoning and (2) the relevant agents may attempt to draw consequences from the features that distinguish the present case from the previous one. The use of the hypothetical reasoning has revealed an important and methodologically challenging issue: the TA attempted to build its argument on assumed information that might have been implicit in the leading case decided by the SAC. The new case was based on a different set of case facts, which might have lead to satisfaction of different set of factors. However, the crucial issue was whether the factor “discovered” by the TA ($f_{1.1}$) was legally relevant in this context at all. Testing these assumptions led the VAC to the conclusion that the reasoning of the TA was fallacious. The TA added unfounded information to the Reasoning Protocol and thus followed a wrong Reasoning Protocol which lead to avoidance of its decision (ITR). In order to focus on the phenomenon described above, we have purposefully omitted the issues of interpretive argumentation [5], [16] and reasoning with values [17], [18], [15], [9]. Also, we have employed the notion of binary factors [4] as opposed to dimensions [7] or recently debated notion of factors with magnitudes [12], [10]. The Reasoning Protocol conception is able to accommodate these different approaches to modeling of case-based knowledge.

6 Conclusions and future work

This paper shows how reasoning with and about factors in the context of statutory interpretation may be described with a tool referred to as Reasoning Protocol. This tool enables researchers to systematize and compare the reasoning used by different agents that arguing in legal cases. With this tool, we have analyzed how factors are used in statutory interpretation and how the issue of factor relevance is addressed in this context. In the discussed example, the factors provided the basis for formulation of interpretive statements. We have also shown how the relevance of certain factors is argued in the context of statutory interpretation and how hypothetical argumentation is used to justify the conclusions in this area. As for the directions of further research, three of them should be mentioned. First, we intend to broaden the scope of analyzed cases and the

information represented in the Reasoning Protocol. The scope of information represented in the Reasoning Protocol will be extended to encompass, inter alia, the interpretive arguments and value-based reasoning. The adopted methodology will be also applied in other domains of law, to evaluate the generalizability of the present approach. It is also not excluded that the analysis of a broader set of cases will enable the use of more complex types of case-based reasoning knowledge representation, such as factors with magnitudes or dimensions. Second, the information and reasoning patterns found in Reasoning Protocols may be integrated with a methodologically different approach, that is, computational modelling of legal argument, enabling automation of reasoning, in such systems as ASPIC+ [13] or Carneades [11]. The Reasoning Protocols may serve as a source of premises for such models and in this context the enthymematic information not represented in the Protocols should be reconstructed. Such a study may provide insights as to the types of information that are left implicit in judicial opinions, as well as in different deficiencies of the actual reasoning (such as inconsistencies, inconsequences, loopholes). As for the third direction, Reasoning Protocols may be fruitfully used for the development of data sets of cases, aiming at providing statistical information about the elements of legal reasoning which can be useful for predicting of outcomes of cases and in information and argument retrieval [8]. The Reasoning Protocol may be used as an outset for the development of a case annotation scheme.

Acknowledgments

The work of Michał Araszkievicz and Tomasz Żurek was part of the project “Legislative errors and the comprehensibility of legal texts” financially supported by the National Science Centre; agreement no. UMO-2018/29/B/HS5/01433

References

1. Corporate Income Tax Act (CITA) of 15 February 1992. Official Journal of Laws no. 21, item 86, consolidated text of 4 April 2019, Official Journal of Laws item 865, as amended.
2. Tax Ordinance Act of 29 August 1997. Official Journal of Laws no. 137, item 926, consolidated text of 25 April 2019, Official Journal of Laws item 900, as amended.
3. Al-Abdulkarim, L., Atkinson, K., Bench-Capon, T.J.M.: Statement types in legal argument. In: *Legal Knowledge and Information Systems - JURIX 2016: The Twenty-Ninth Annual Conference*. pp. 3–12 (2016). <https://doi.org/10.3233/978-1-61499-726-9-3>
4. Aleven, V.: Teaching case based argumentation through an example and models. Ph.D. thesis, Phd thesis, University of Pittsburgh, Pittsburgh, PA, USA (1997)
5. Araszkievicz, M.: Towards systematic research on statutory interpretation in AI and law. In: *Legal Knowledge and Information Systems - JURIX 2013: The Twenty-Sixth Annual Conference*, December 11-13, 2013, University of Bologna, Italy. pp. 15–24 (2013). <https://doi.org/10.3233/978-1-61499-359-9-15>

6. Araszkiewicz, M., Zurek, T.: Comprehensive framework embracing the complexity of statutory interpretation. In: *Legal Knowledge and Information Systems - JURIX 2015: The Twenty-Eighth Annual Conference*, Braga, Portugal, December 10-11, 2015. pp. 145–148 (2015)
7. Ashley, K.: *Modeling Legal Argument: Reasoning with Cases and Hypotheticals*. The MIT Press (1990)
8. Ashley, K.: *Artificial Intelligence and Legal Analytics: New Tools for Law Practice in the Digital Age*. Cambridge UP (2017)
9. Atkinson, K., Bench-Capon, T.: States, goals and values: Revisiting practical reasoning. In: *Proceedings of 11th Intl. Workshop on Argumentation in Multi-Agent Systems* (2014)
10. Bench-Capon, T.J.M., Atkinson, K.: Lessons from implementing factors with magnitude. In: *Legal Knowledge and Information Systems - JURIX 2018: The Thirty-first Annual Conference*, Groningen, The Netherlands, 12-14 December 2018. pp. 11–20 (2018). <https://doi.org/10.3233/978-1-61499-935-5-11>
11. Gordon, T.F., Prakken, H., Walton, D.: The carneades model of argument and burden of proof. *Artificial Intelligence* **171**(10–15), 875 – 896 (2007), argumentation in Artificial Intelligence
12. Horty, J.: Reasoning with dimensions and magnitudes. *Artificial Intelligence and Law* **27**(3), 309–345 (2019). <https://doi.org/10.1007/s10506-019-09245-0>
13. Modgil, S., Prakken, H.: The ASPIC+ framework for structured argumentation: a tutorial. *Argument and Computation* (5), 31 – 62 (2014)
14. Rissland, E.L., Skalak, D.B.: Cabaret: rule interpretation in a hybrid architecture. *International Journal of Man-Machine Studies* **34**(6), 839 – 887 (1991). [https://doi.org/https://doi.org/10.1016/0020-7373\(91\)90013-W](https://doi.org/https://doi.org/10.1016/0020-7373(91)90013-W), <http://www.sciencedirect.com/science/article/pii/002073739190013W>, al and Legal Reasoning. Part 1
15. Sartor, G.: Doing justice to rights and values: teleological reasoning and proportionality. *Artificial Intelligence and Law* **18** (2010)
16. Walton, D., Sartor, G., Macagno, F.: *Statutory Interpretation as Argumentation*, pp. 519–560. Springer Netherlands, Dordrecht (2018). https://doi.org/10.1007/978-90-481-9452-0_18
17. Zurek, T., Araszkiewicz, M.: Modeling teleological interpretation. In: *Proceedings of the Fourteenth International Conference on Artificial Intelligence and Law*. pp. 160–168. ACM (2013)
18. Zurek, T.: Goals, values, and reasoning. *Expert Systems with Applications* **71**, 442 – 456 (2017). <https://doi.org/http://dx.doi.org/10.1016/j.eswa.2016.11.008>