In Theory

Nine Degrees of Uncertainty in Negotiations

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Joint decision-making processes such as negotiations play a vital role in diverse societal contexts spanning from business and politics to sustainability-related negotiations. One of the most prominent examples of how negotiations play an important role in overcoming societal challenges was the COVID-19 vaccine supply negotiations. These negotiations have put the spotlight on an aspect of joint decision-making that always has been of great interest to both negotiation researchers and practitioners yet remains empirically understudied—the effect of uncertainty. In the present article, we develop a framework of uncertainty in negotiation using the COVID-19 vaccine supply negotiations between the European Union and pharmaceutical companies as an example. More specifically, we categorize different kinds of uncertainty based both on mathematical considerations

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(i.e., differentiation between risk, ambiguity, and uncertainty) as well as on more circumstantial factors. To do so, we adapted the nine kinds of uncertainty in environmental governance proposed by Dewulf and Biesbroek to the more general context of negotiations. We first differentiate between three natures of uncertainty (i.e., lack of knowledge, unpredictability, and interpretations) and three objects of uncertainty (i.e., issue-based, strategy-based, and context-based). Second, we illustrate the psychological barriers that negotiators face when handling uncertainty, before concluding with proposals for practitioners on how to manage different kinds of uncertainty. Overall, we aim at stimulating investigations of the effects of uncertainty in mixed-motive decision-making while simultaneously helping negotiation teachers and practitioners better cope with the additional demands created by specific kinds of uncertainty.

Keywords: negotiation, social psychology, decision-making, uncertainty, risk

> When we were negotiating [vaccines], there was absolutely no possibility to see what was going to be the likelihood of obtaining an authorization and of delivering the vaccines at a certain date.
>
> Sandra Gallina 2021

Introduction

Following the first wave of COVID-19 cases in 2020, nation states around the world struggled with how to respond to the dynamically evolving pandemic situation. As the United Nations Secretary-General (2020) noted in a briefing to UN members in late March of 2020, governments faced unprecedented challenges in the health and education sectors as well as economic markets. In emphasizing that these challenges "must be addressed [by governments] through multilateral cooperation" (United Nations Secretary-General 2020, para. 7), the Secretary-General acknowledged that to combat challenges on a pandemic scale, nation states must rely on joint decision-making processes. Nation states, policy makers, and company representatives must resolve conflicts of interest in challenges as diverse as mask provisioning, school openings, or vaccine deliveries through a process of negotiation (Gelfand, Fulmer, and Severance 2011). What is likely the most prominent example of these negotiations commenced in the early summer of 2020, when several

pharmaceutical companies began running phase I/II clinical trials for their Covid-19 vaccines (e.g., Mulligan et al. 2020). To secure a supply of the hoped-for vaccines, nation states swiftly sought to negotiate advance purchase agreements with those companies. By late June of 2020, the European Union (EU) had begun negotiations with the six most promising vaccine producers, securing advance purchase agreements only after intense, months-long negotiations, some of which continued until the following November (European Commission 2021). Although these negotiations might have appeared to be clear-cut—a simple buyer–seller negotiation over the sale of one product—they were anything but simple. Negotiators faced many structural, legal, and strategic difficulties in negotiating the supply of COVID-19 vaccines. In trying to understand the extraordinary challenges negotiators faced, this article focuses on the psychological barriers that *uncertainty* evoked within the negotiations. As Sandra Gallina (2021)—the EU's lead negotiator—told the EU Committee on Budgets, the negotiations involved issues that were unpredictable in nature. The vaccines were not yet approved, manufacturing capacities were not yet built, supply chains for raw materials were not yet procured, and vaccine prices were subject to change.

Because of the extraordinary circumstances arising from the pandemic (e.g., a high degree of uncertainty, societal pressure, and time constraints) (e.g., Altig et al. 2020; Betsch et al. 2020; Leitner 2020; Hills and Eraso 2021), uncertainty—an overlooked aspect of many negotiations—has taken the spotlight. Uncertainty is a factor in many kinds of negotiations. Buyers and sellers must deal with the uncertainty of ever-changing markets, political parties have coalition partners whose motives might not be transparent, and lawyers often work with potentially incomplete information. Although individual decision-making under risk and uncertainty has been investigated quite extensively (see e.g., Fox, Erner, and Walters 2015), little is known about interactive, social decision-making under risk and uncertainty. However, with uncertainty omnipresent in many kinds of negotiations (e.g., Lax and Sebenius 2006; Thompson 2006), understanding the psychological effects uncertainty has on negotiations—one of the most important crisis-management behaviors—is of utmost importance. Therefore, providing policy makers, businesspeople, and negotiators with strategies to deal with uncertainty must be a top priority for researchers studying joint decision-making.

The present article seeks to provide practitioners, negotiation teachers, and researchers alike with a sound framework and understanding of how uncertainties affect the joint decision-making process of negotiation. We set out to identify distinctive sources of uncertainty and the psychological barriers associated with them, while illustrating different kinds of uncertainty by elaborating on the COVID-19 vaccine supply negotiations.

In addition to a structured categorization of uncertainty, we provide practitioners with proposals on how to deal with different kinds of uncertainties in negotiations. Furthermore, we highlight areas in which researchers of joint decision-making should invest time and effort to advance our understanding of psychological barriers. Together, these efforts will not only stimulate research; they will also help negotiation teachers and practitioners facing unprecedented uncertainties (e.g., because of a pandemic) to cope better with the additional demands that such uncertainties create.

Uncertainty in Negotiations

A negotiation is a joint decision-making process in which at least two parties with opposing interests (e.g., the EU and a vaccine manufacturer) try to reach agreement on how to resolve their interdependence collectively (Pruitt and Carnevale 1993). Negotiators can face uncertainties in multiple ways. For example, during the Covid-19 vaccine supply negotiations, many factors—ranging from the possibility of virus mutations to the delivery schedule of vaccines—were far from certain. Moreover, as evidenced by the legal dispute between the EU and AstraZeneca about what the *best effort clause* for vaccine delivery specifically entails (Deutsche Welle 2021), it was uncertain for both parties whether they would each implement their agreement vigorously and consistent with each other's expectations.

Thus, the assessment of Christopoulos et al. (2009) regarding individual decision-making behavior—"the value and risk of an option along with the agent's risk aversion are the basic factors implicated in the choice behavior" (12582)—also applies to joint decision-making processes. The probability that the predicted number of vaccine doses would be available or the proposed vaccine delivery schedule would be met was less than 100 percent. Moreover, negotiators differ in the degree to which they are willing to take risks (i.e., their risk aversion). Together, the uncertainty of outcomes and individual differences in risk aversion complicate the negotiation process.

The negotiation literature contains only limited empirical insights into how uncertainties affect negotiators. The few studies that have investigated the effects of uncertainty in negotiations report that negotiators use less cooperative (i.e., integrative) strategies when the outcome of at least one negotiation issue is ambiguous (Essa, Dekker, and Groot 2018). Additionally, in negotiations with multiple rounds of proposals and counterproposals, "the buyer is willing to make concessions, apparently to compensate for the seller's uncertainty" (Church and Zhang 1999: 427). Sellers who faced risky outcomes achieved bigger gains than sellers who received their outcomes with certainty. However, these research findings are limited to the uncertainty stemming from the negotiation issues themselves. While this kind of uncertainty is salient in

many negotiations, it is not the only source of uncertainty for negotiators. For example, in negotiations between the EU and pharmaceutical companies, the EU did not know what contracts the companies had signed with other countries and how these might affect the delivery of COVID-19 vaccines to the EU.

With only isolated findings on uncertainty in the negotiation literature, we turn to individual decision-making and governance research to build a framework of different kinds of uncertainty in negotiations, before illustrating how these uncertainties pervaded the COVID-19 vaccine supply negotiations.

Uncertainties in Individual Decision-Making and Governance

Like negotiations, decisions on the individual level and in the governance domain are prone to uncertainty. To structure the many kinds of uncertainty that decision-makers face, several categorizations of uncertainty have been proposed in the individual decision-making literature (for an overview, see e.g., Fox, Erner, and Walters 2015) and the governance literature (e.g., Dewulf and Biesbroek 2018).

Investigations into individual decision-making have differentiated between kinds of uncertainty based mainly on their underlying mathematical probability distribution. More specifically, a distinction has been proposed between risk (knowing the exact likelihoods of different outcomes), uncertainty (not knowing the likelihoods of different outcomes) (Knight 1921), and ambiguity (knowing a range of possible likelihoods for different outcomes) (Ellsberg 1961; Ritov and Drory 1996).[1] However, the terminology has been applied inconsistently, making it complicated to compare studies even within the individual decision-making literature.

Unlike the individual decision-making literature, the governance and policy literature has made important differentiations between kinds of uncertainty based on the origin of the uncertainty. This line of research has focused more on the sources of uncertainty than its mathematical underpinnings. As a summary of different approaches to differentiate between kinds of uncertainty, Dewulf and Biesbroek (2018) categorized three *types* of uncertainty and three *objects* of uncertainty. While the *types of uncertainty* refer to the nature of the uncertainty, the *objects of uncertainty* describe what the uncertainty is about. More specifically, the three types of uncertainty differentiate between *incomplete knowledge* (uncertainty that stems from an individual's lack of knowledge), *unpredictability* (uncertainty that stems from the *objects* themselves), and differing *interpretations* (uncertainty that stems from the possibility of different interpretations). The

three objects of uncertainty differentiate between certainty that is *issue-based* (uncertainty about the negotiation issues), *strategy-based* (uncertainty about negotiators' [inter]actions), and *context-based* (uncertainty about the negotiation context) (see Table One). Dewulf and Biesbroek (2018) propose that each kind of uncertainty has its own difficulties and negotiators need different strategies to deal with each effectively. However, it is important to note that Dewulf and Biesbroek do not differentiate between risk, ambiguity, and uncertainty in the mathematical sense.

In adapting Dewulf and Biesbroek's (2018) framework of uncertainty to the joint decision-making context, we combine their differentiation of natures and objects of uncertainty with the typical mathematical differentiation of distinctive kinds of uncertainty found in the individual decision-making literature (Knight 1921; Ellsberg 1961). In doing so, we argue that negotiators face a multitude of uncertainties concerning (1) negotiated issues, (2) strategic decisions, and (3) contextual roadblocks. In addition, these uncertainties can be divided into (a) incomplete knowledge, (b) inherent unpredictability, and (c) varying interpretations. We use the example of negotiations between the EU and pharmaceutical companies to show how the combination of all these influences makes negotiations exceptionally wearisome.

Kinds of Uncertainty in Negotiations

We now consider examples of each kind of uncertainty that arose in the COVID-19 vaccine supply negotiations before proposing approaches to deal with these uncertainties. We first discuss all three types of issue-based uncertainty, then turn to strategy-based uncertainties and finally, elaborate on context-based uncertainties.

Issue-Based Incomplete Knowledge

The COVID-19 vaccine supply negotiations provide at least two prominent examples of issue-based incomplete knowledge. Both relate to the fact that the vaccine was still in its preparatory state when the negotiations took place. Without results from phase III clinical trials, the negotiations revolved around a vaccine that was not yet shown to be safe and effective. Moreover, as the vaccine was still subject to final changes, so were its contents and price per dose (see e.g., European Commission 2020b). With the core elements of a possible agreement (effectiveness and vaccine price) unknown, negotiators had to decide whether to wait for more complete knowledge about the issues or negotiate notwithstanding their issue-based incomplete knowledge.

Table One
Categorization of Different Kinds of Uncertainties in Negotiations

Type of uncertainty			
Object of uncertainty	*Incomplete knowledge*	*Unpredictability*	*Interpretations*
Negotiation issues	Lack of knowledge about the negotiation issues	Unpredictability of the negotiation issues	Differing interpretations of the negotiation issues
Negotiators' (inter)actions	Lack of knowledge about the (inter)actions of negotiators	Unpredictability of the (inter) actions of negotiators	Differing interpretations of the (inter)actions of negotiators
Negotiation context	Lack of knowledge about the negotiation context	Unpredictability of the negotiation context	Differing interpretations of the negotiation context

Each kind of uncertainty can theoretically have any of the three kinds of mathematical underpinnings (risk, ambiguity, or uncertainty).

Issue-based incomplete knowledge is not an uncertainty inherent in negotiation issues but rather a "state of mind" (Dewulf and Biesbroek 2018). While the negotiation options and consequences are inherently certain, each party lacks knowledge about these options and consequences so they perceive them to be uncertain. Reducing issue-based incomplete knowledge therefore requires searching for information about the negotiation issues and their consequences. It is theoretically possible for negotiators to eliminate completely all kinds of issue-based uncertainty (lack of knowledge about negotiation issues, negotiators' (inter)actions, and negotiation context). Once issue-based incomplete knowledge is eliminated, negotiators must still negotiate on their (partly) opposing interests.

Lacking knowledge about the contents of the negotiation can affect negotiators and the negotiation process in multiple ways. When both parties lack knowledge, they can agree to search together for more knowledge, to postpone the negotiation until a reasonable amount of knowledge is available, or to negotiate notwithstanding the lack of information.

Parties rarely have the same base of knowledge about negotiation issues (e.g., Gelfand, Fulmer, and Severance 2011). While intuitively it might seem that the party with less information would be disadvantaged in a negotiation, Church and Zhang (1999) have found that in multi-round negotiations, negotiators with risky payoffs were able to claim more value in negotiations in which only the counterpart had certain payoffs than in negotiations in which they themselves had certain payoffs as well. Whether or not these findings hold true when the riskiness is not inherent in the issues' payoffs but rather occurs due to a negotiator's lack of knowledge remains an interesting avenue for future investigations. Overall, whenever parties do not have the opportunity to deepen their understanding of the negotiation issues from external sources, their ability to reduce issue-based incomplete knowledge may depend on their counterpart's knowledge base and their willingness to share that knowledge. Studies on knowledge asymmetry concerning parties' preferences give a first indication of the effects that we could expect to see when negotiators face issue-based incomplete knowledge (e.g., Stuhlmacher and Champagne 2000; Fisher, Frederickson, and Peffer 2002; Schei and Rognes 2003; Gastinger 2016). For example, Schei and Rognes (2003) report that to overcome information asymmetry about a party's preferences for certain issues, the party with more information must have a cooperative (rather than competitive) mindset for the negotiators to exploit win-win potential.

Whether the EU decided to negotiate with incomplete knowledge rather than postpone the COVID-19 vaccine supply negotiations is not

known. While some negotiations (e.g., with AstraZeneca and Sanofi-GSK) were concluded rather quickly, negotiations with BioNTech/Pfizer, CureVac, and Moderna took up to six months (European Commission 2021). The length of the negotiations suggests that at least for some of the vaccine candidates, the EU decided to wait for the results of more clinical trials to reduce issue-based incomplete knowledge uncertainty. Similarly, to individual decision-makers, by choosing to delay an agreement until more certainty could be expected, the vaccine negotiators seem to have shown uncertainty avoidance (Hardisty and Pfeffer 2016).

Issue-Based Unpredictability

During the Covid-19 vaccine supply negotiations, neither the EU nor the pharmaceutical companies knew how the pandemic would evolve. Especially worrisome were mutations of the virus (Adam 2021). While the vaccine's effectiveness against the original strain of the virus was an uncertainty driven by a lack of knowledge (the effectiveness can be and was determined through clinical III trials), mutations of the virus are unpredictable, natural changes that may potentially make any vaccine useless. The "payoff" of any vaccine—the number of infections prevented considering unpredictable virus mutations—can be said to fall under the category of issue-based unpredictability.

Issue-based unpredictability arises when the consequences of choosing certain options are—at least in part—unpredictable. Such unpredictability does not arise from a negotiator's lack of knowledge, their behavior, or their interpretation of their counterpart's behavior, but rather from the uncertainty of the issues themselves. Importantly, issue-inherent uncertainty cannot be lessened through gaining more knowledge. Thus, negotiators' ability to reduce such uncertainty is extremely limited. In dealing with issue-based unpredictability, negotiators will therefore most likely adopt approaches that are different than those they use when dealing with their issue-based lack of knowledge.

The few studies that have investigated uncertainty in negotiations typically operationalized uncertainty as the potential outcomes merely occurring with a specified probability instead of certainty (e.g., Schurr 1987; Bottom 1998; Church and Zhang 1999; Essa, Dekker, and Groot 2018). These studies could be said to have investigated issue-based unpredictability, because the uncertainty introduced in their paradigms was inherent in the choice options, leaving the negotiators with payoffs that are risky (specific probabilities for each choice options), ambiguous (a range of possible probabilities for each choice option), or even uncertain (no information about the probabilities for each choice option), without any possibility to reduce the uncertainty through additional knowledge gains.

Initial evidence suggests, for example, that gain and loss framing manipulations affect negotiators differently depending on their outcomes being probabilistic or certain (Bottom 1998). Issue-based unpredictability can further affect negotiators' strategy use. Essa, Dekker, and Groot (2018) report that in general, as soon as one negotiation issue is inherently ambiguous, negotiators use less integrative (i.e., win-win) strategies. Omitting the possibility of integrative solutions in a negotiation can have detrimental effects. Failing to recognize win-win possibilities decreases joint outcomes and may even increase the likelihood that there will be an impasse in the negotiation (De Dreu, Weingart, and Kwon 2000; Fisher, Ury, and Patton 2011)—the worst possible outcome when negotiating about potential pandemic relief efforts. Nevertheless, basic questions as to how negotiators deal with issue-based unpredictability have been underinvestigated. For example, the question of whether negotiators focus more on the benefit value of a choice option or the associated probability of receiving that benefit remains unanswered.

Issue-Based Interpretations

Uncertainty concerning negotiation issues can stem not only from an individual's lack of knowledge or the issues' inherent unpredictability, but also from the possibility of interpreting information in different ways. While there were no obvious differences in issue-based interpretations during the COVID-19 vaccine supply negotiations (at least to the public's knowledge), it is easy to think of potentially divergent interpretations. Both parties were aiming for a vaccine that is safe and effective. But what exactly *safe* or *effective* means can undoubtedly be construed differently. To combat this kind of uncertainty, the EU used regulatory bodies such as the European Medical Agency (EMA) to set a common standard for assessing the vaccine's safety and effectiveness (European Commission 2020a), thereby reducing the possibility that negotiation parties would assess the negotiation issues from different reference points.

Without such a common ground, it is easy for negotiators to interpret the same outcomes for negotiation options in comparison to different reference points. Studies on so-called procedural framing have started to investigate the effects of different reference points in negotiations. Majer et al. (2020) investigated the effect of gain and loss frames in negotiations and report that negotiators behave differently depending on their resource reference point. Similarly, the possibility that parties will interpret the outcome of a particular negotiation option differently is expected to affect negotiators.

Scholars have proposed that the pre-negotiation phase is important to the success of a negotiation (e.g., Jang, Elfenbein, and Bottom 2018), arguing that "it is imperative to better understand what drives

the behaviors executed at the negotiation table" (Peterson and Lucas 2001: 37). It is possible to understand the act of negotiating about the negotiation (for example, negotiating about which issues to discuss) (e.g., Warsitzka et al. 2022) as aimed at reducing differences in issue-based interpretations by eliminating different reference levels or at least making the parties aware of the different reference levels at which they have entered the negotiation. Since realizing that a negotiation counterpart perceives the negotiation differently from oneself helps the parties reach win-win agreements (Fisher, Ury, and Patton 2011), some form of perception of differences in issue-based interpretations might even encourage parties to find optimal integrative solutions.[2]

Strategy-Based Incomplete Knowledge

While the preferences of each party were clear during the COVID-19 vaccine supply negotiations (offering and buying a safe and effective COVID-19 vaccine as fast as possible), a simple fact made the lack of knowledge about their counterpart's actions even more severe. Parties were negotiating about a scarce resource. Vaccine sellers did not have enough vaccine doses to satisfy all potential buyers and could choose to whom they would sell. More importantly, although vaccine buyers knew about the scarcity of vaccine doses, they did not know what kind of agreements the vaccine manufacturers were making with other countries. The possibility that potential buyers would receive less (or no) doses—or that delivery of them would be delayed—if they adopted a tough negotiation style was a constant uncertainty stemming from their strategy-based incomplete knowledge.

Lacking knowledge about a counterpart's interests, preferences, payoffs, and best alternative to a negotiated agreement (BATNA) can increase a negotiator's uncertainty about which negotiation strategy to use (distributive, integrative, or a combination of both). If information is exchanged between negotiation parties, their strategy-based knowledge might cease to be incomplete. Thus, reducing the incomplete nature of strategy-based knowledge depends on a counterpart's willingness to share information. However, sharing information about one's preferences is not always the ideal negotiation strategy. According to Murnighan et al. (1999), "[I]f negotiators reveal information about their priorities and preferences, more efficient agreements may be reached but the shared information may be used strategically by the other negotiator, to the revealers' disadvantage" (313).

Inability to map out one's negotiation strategy due to factors such as a lack of knowledge about one-sided time constraints (e.g., Carnevale, O'Connor, and McCusker 1993; Stuhlmacher, Gillespie, and

Champagne 1998) or a negotiation counterpart's orientation (individualistic or cooperative) (Schei and Rognes 2003) can increase uncertainty about which negotiation strategy to use, thereby hindering the identification of integrative solutions and leaving parties at a strong bargaining disadvantage. With this in mind, the EU was likely struggling to find the right strategic balance between cooperation and competition (De Dreu and Carnevale 2003). The negotiation period was likely prolonged due to the strategy-based lack of knowledge created by, for example, the pharmaceutical companies' failure to disclose their contracts with other countries.

Strategy-Based Unpredictability

A crucial part of the vaccine negotiations was the delivery schedule for the vaccine doses. Although the negotiating parties agreed upon a timetable of vaccine deliveries (usually per quarter; see e.g., European Commission 2021), parties' obligation to abide by the timetable was limited by a *best-effort clause*. Vaccine manufacturers agreed only to do their best to deliver according to the agreed-upon schedule. Theoretically, manufacturers would face sanctions if they did not meet the delivery schedule. However, whether they did *their best* is a legal determination. A lengthy court case to settle disputes about what constitutes best efforts would not support vaccine buyers in their quest to vaccinate their population as fast as possible. This left the buyers with a degree of strategy-based unpredictability about the sellers' intentions to deliver on their promises and adhere to the implementation of the agreed-upon contract.

Whenever the actions of a counterpart (or interactions with a counterpart) cannot be known, the strategy-based lack of knowledge turns into strategy-based unpredictability. The (inter)actions become unpredictable and cannot be dealt with by obtaining more information. Dewulf and Biesbroek (2018) use the well-known prisoner's dilemma as an example of strategy-based unpredictability: "a decision needs to be made in which the outcome depends strongly on a decision that somebody else will take" (449). Similarly, Stuart (2011) notes that negotiations can be "modeled as a game of creating and claiming [value]" (188). Negotiators need to manage the tension between claiming as much value as possible for themselves and creating value together with their counterpart—without knowing which strategies their counterpart is exercising. Because negotiations are joint decision-making processes in which one's own behavioral possibilities (partly) depend on a counterpart's actions, strategy-based unpredictability is almost inevitable for negotiators. Whether or not a negotiation counterpart will disclose their true preferences or BATNAs

or adhere to the final agreement can therefore be a source of great uncertainty. Jang, Elfenbein, and Bottom (2018) point out the uncertain nature of negotiated agreements when they argue in favor of "separating agreements from implementation" (336). They point out that the literature has focused mainly on the bargaining phase of an agreement and not on its implementation. First attempts to investigate strategic ontological uncertainty have used prison dilemma game-like procedures (e.g., Bohnet, Frey, and Huck 2001; Miller and Whitford 2002) but there have been no investigations into the joint decision-making processes that make negotiations unique.

Oftentimes, negotiators try to mitigate strategic ontological uncertainty by executing a contract. By making their counterpart agree upon a set of future behaviors (e.g., the exchange of goods at a certain rate), parties hope to reduce a large portion of the uncertainty concerning such behaviors. Whether or not a party will adhere to the contract, however, is uncertain. In the case of the contract between the EU and AstraZeneca, a Belgium court was asked to settle a first dispute concerning interpretation of the contract's best-effort clause (Deutsch 2021), showing that strategy-based unpredictability can be a threat to negotiators who rely on a contract's provisions, such as those setting forth the number of vaccines to be delivered and the timeline for such delivery.

Strategy-Based Interpretations

While the vaccine manufacturers could have been certain of their buyer's actions (the EU was trying to get vaccine doses as fast as possible), the manufacturers' actions were subject to strategy-based interpretations and thus could be interpreted in different ways. For example, the EU was uncertain as to whether the best-effort clause expressed a legitimate concern of the manufacturers or was simply a strategy that allowed them to sign contracts for a higher number of doses than they could have promised had the contracts lacked such clause. Similarly, the vaccine manufacturers' demand to eliminate liability (Apuzzo, Gebrekidan, and Pronczuk 2021) could be interpreted in multiple ways. Were the manufacturers simply trying to protect their companies from possible unknown damages or had they assessed the risk of the vaccine's long-term side effects to be higher than they were willing to acknowledge publicly?

Negotiation parties might lack knowledge not only of their counterparts' future actions but of their present actions as well. "What one actor may frame as an unavoidable defensive response may be framed as an aggressive provocation by another" (Dewulf and Biesbroek 2018: 451). For example, interpreting a counterpart's proposal as a desperate last resort,

when in fact it is backed up by a strong BATNA, can have negative consequences for the negotiation as a whole if one's response to such move is inappropriate. "The fact that the very offer of a particular proposal or concession […] may diminish its apparent value or attractiveness in the eyes of the recipient" (Ross 1993: 28)—a phenomenon known as "reactive devaluation"—has long been discussed in the negotiation literature. Reactive devaluation and other psychological practices add to the uncertainty created by misjudging the (inter)actions of a negotiation partner.

Insights from intercultural negotiation research offer a first glimpse at the effect of strategy-based interpretations. For example, the degree of trust in one's negotiation counterpart differs across cultures (Gunia et al. 2011). Indian negotiators trusted their counterparts less than American negotiators—a strategy-based interpretation—leading to more distributive negotiation strategies and lower joint outcomes. Moreover, general cultural differences in preferred negotiation strategies (e.g., informational deception and displays of dominance) have been documented extensively. (For an overview, see Kaushal and Kwantes 2006; Gunia, Brett, and Gelfand 2016.) Such differences raise the question of whether interpreting the actions of a negotiator from a different culture increases uncertainty from strategy-based interpretations. However, while *inter*cultural differences are likely to exist, negotiators should keep in mind that *intra*cultural differences, meaning differences in negotiation style within negotiators of the same culture, are likely to exist as well (e.g., Brett 2014). While the cultural differences might have been minor during the Covid-19 vaccine negotiations, psychological processes like reactive devaluation undeniably increased the parties' strategy-based interpretational uncertainty.

Context-Based Incomplete Knowledge

When the EU decided to negotiate with pharmaceutical companies as a whole and not on a member state by member state basis (European Commission 2020a), there was a lack of knowledge about how such a negotiation process would proceed. It was the EU's first time negotiating as one with pharmaceutical companies. Needing a new approach to the approval of vaccines, the EU decided to use a centralized approval process administered by the European Medicines Agency (EMA) (European Commission 2020a). Reducing this uncertainty—stemming from context-based incomplete knowledge—by setting this approval vaccine process in place in advance of the negotiations (it was part of the final agreements) added another level of complexity.

Context-based incomplete knowledge refers to the potential lack of knowledge about the legal restrictions or informal standards of behavior at the negotiation table. Dewulf and Biesbroek (2018) refer to the institutional object of uncertainty as the "rule of the game" (446). Based

on March and Olsen (1989), Dewulf and Biesbroek (2018) differentiate between formal and informal rules. The former describes openly accessible guidelines like legal documents, meeting notes, and codes of conduct. Informal rules, however, cannot be found in any written document but must be formed through social interaction with a negotiation partner. While formal rules of the game mainly are a knowledge problem—a kind of context-based incomplete knowledge—informal rules are more difficult to predict and could therefore just as easily be context-based unpredictability.

Context-based incomplete knowledge is especially salient in international business or policy negotiations, when one or both parties must negotiate in unchartered territory with unknown contextual rules. Coordinating with all 27 health ministers of the EU, all of whom had different interests and agendas, turned out to be a challenging and time-consuming endeavor. Moderna's CEO concluded that the effects of this context-based incomplete knowledge most likely did not affect the number of doses delivered to the EU but did affect the speed at which the doses were delivered (Deutsch and Wheaton 2021).

Context-Based Unpredictability

Once the EU's centralized vaccine approval process was set up, the question of whether individual member states would adhere to the rules of the process was unpredictable, thereby increasing the context-based unpredictability. That the behavior within the EU remained unpredictable surfaced in January of 2021, when individual member states announced the purchase of vaccines that had not been approved by the EMA or of a number of doses greater than that upon which the EU had agreed to in the negotiations (Deutsch and Wheaton 2021).

Whenever the rules of the game are unknown or subject to unpredictable change, context-based incomplete knowledge becomes context-based unpredictability. It can be especially difficult to attain knowledge about rules of behavior that are informal; this is particularly a problem in intercultural negotiations (e.g., Kaushal and Kwantes 2006; Gunia, Brett, and Gelfand 2016). However, intercultural differences are only one source of context-based unpredictability. Formal and informal rules might change over time due to societal change, external influences, or changes in personnel holding positions of power. Especially in negotiations over a long period, the counterparts that parties face during the negotiation of a contract might differ from those faced during implementation of the contract (Majer et al. 2021). Comparably, in political negotiations, democratic elections or other forms of regime change could alter both formal

and informal rules of an ongoing negotiation process in unpredictable ways. Likewise, negotiating on behalf of a large, diverse group of stakeholders can increase context-based unpredictability. The more stakeholders involved in a negotiation, the more likely it is that one or more stakeholders do not adhere fully to the contextual rules set out for the negotiation. The negotiations between pharmaceutical companies and the 27-member state EU were, therefore, naturally prone to bear more contextual-based unpredictability than similar negotiations between pharmaceutical companies and individual nation states.

Context-Based Interpretations

Uncertainty resulting from differences in context-based interpretations may have been low during the Covid-19 vaccine negotiations since given the gravity of the pandemic, both sides understood the importance of their negotiations. Nevertheless, the negotiators could have had different interpretations of the rules—both formal rules such as regulatory approval guidelines and informal rules around behavior at the negotiation table.

Whenever parties interpret the negotiation's formal and informal rules differently, the negotiation process is harmed by such conflicting understandings. The parties may, for example, have different interpretations of the importance or implementation of an agreement. Similarly, the possibility that courts will interpret formal rules in different ways—depending, for example, on their jurisdiction and whether their rulings are subject to appeal—adds to negotiators' uncertainty. As with issue-based and strategy-based interpretations, the mere possibility that the same contextual factors may be interpreted differently has the potential to increase negotiators' uncertainty.

Concluding Thoughts and Propositions for Dealing with Uncertainty

In the present article, we have set out a comprehensive categorization of different kinds of uncertainties that may arise in negotiations. By building upon the model of Dewulf and Biesbroeks (2018), we have systematically differentiated between nine kinds of uncertainty that COVID-19 vaccine buyers and sellers faced during their negotiations. Three *natures of uncertainty—lack of knowledge, unpredictability*, and *interpretations*—can be further subdivided by three *objects of uncertainty—issue-based*, *strategy-based*, and *context-based* (see Table One). Not every negotiation is affected by all nine kinds of uncertainty. However, every negotiator should be aware that each of these uncertainties could affect their bargaining process in critical ways. Uncertainty of different kinds has the potential to prolong

negotiations or even to lead to higher impasse rates. In high-stakes negotiations like the Covid-19 vaccine supply negotiations, this would result in a delivery of life-saving vaccines more slowly than possible and in fewer doses than possible.

Many of these different kinds of uncertainties can be identified mathematically as risk, ambiguity, or uncertainty. This is important to keep in mind because the approach needed to deal with risk differs from the approach needed to deal with uncertainty. While mathematical forecasting models are particularly good for sound decision-making under circumstances of risk (known probabilities), the application of experience and common sense is better for decision-making under circumstances of uncertainty (unknown probabilities) (Gigerenzer 2015).

More specifically, the heterogeneity of different kinds of uncertainties makes a one-type-fits-all approach unsuitable for dealing with uncertainty in negotiations. To handle uncertainty effectively, negotiators need to differentiate between kinds of uncertainties so that they can choose suitable approaches. Here again, the COVID-19 vaccine negotiations illustrate ways for negotiators to deal with uncertainties. Together with our own propositions, we will now turn to a more practical side, elaborating on how nation states, policy makers, and company representatives can deal with different kinds of uncertainty.

With all vaccines still in the preparatory state during the Covid-19 vaccine supply negotiations in the summer and fall of 2020, the EU decided to diversify its portfolio of vaccines and order more doses than would be needed if all vaccines turned out to be safe and effective (European Commission 2021). While this does not itself reduce any issue-based uncertainty, by increasing the number of vaccine doses it purchased, the EU increased its chances of investing in at least one or two vaccines that would prove to be safe and effective. Additionally, by delaying its purchase until the fall of 2020 when more data on the vaccines would become available, the EU seems to have waited for some of the issue-based lack of knowledge to resolve (European Commission 2021). To deal with strategy-based uncertainty, negotiators should try not only to clarify their own BATNA, but also to gather as much information as possible about their counterparts' outcomes, preferences, and BATNAs. Fostering trustworthy communication with the counterpart is key. To do so, negotiators oftentimes are advised to focus on actively and carefully listening to their counterpart (Shapiro 2017). While we know from intercultural negotiation studies that misunderstandings of informal rules can be a great source of context-based uncertainty (e.g., Kaushal and Kwantes 2006; Gunia, Brett, and Gelfand 2016), we know very little about how to combat

such uncertainty. However, much of the uncertainty stemming from the possibility that negotiators will interpret issues, strategies, or contexts differently can be resolved by negotiating about the negotiation (Jang, Elfenbein, and Bottom 2018). By clarifying the negotiation's issues, the consequences of different choice options, the meanings of negotiators' (inter)actions, and the rules that apply to the negotiation, negotiation parties can reduce the possibility that either party will misunderstand the other.

More generally, dealing with uncertainty requires monitoring decisions, continuously adapting one's choice preferences, and providing flexibility for both negotiation parties (e.g., Wheeler 2013). By including in its contracts the "options" to buy further doses later, the EU managed to delay its decision to buy more vaccine doses until a time when there was less issue-based uncertainty. This approach makes it possible to reevaluate one's decision; the EU used this approach in deciding not to act upon its options to buy more vaccine doses from AstraZeneca (Guarascio and Jones 2021). Nevertheless, the EU could have used supplementary approaches to push the decision process to a time when there would be more certainty by implementing if-then rules (i.e., contingency contracts) (e.g., Susskind 2014). Negotiation parties could have made parts of their contract conditional on the reduction of specific uncertainties. For example, the contract could have stated that specific delivery deadlines would be met if a vaccine authorization was obtained before a certain date. In this way, the best effort clause could have been specified to a higher degree—offering both parties less room for differing interpretations and thereby reducing interpretational uncertainty. Finally, negotiators facing uncertainty should understand that mistakes happen in uncertain circumstances. The ability to accept the fact that negotiated agreements might prove to be suboptimal is key to staying flexible and continuously adapting the agreement.

One way to practice negotiating with uncertainty or teach about the effects of uncertainty in negotiations is to use negotiation simulations. Many simulations, such as the "Mercury Negotiations" (Stokes and Selin 2016), "Ren the Robot" (San Pietro n.d.), or "Pearl River" (Diessner et al. 2020) include aspects of uncertainty in negotiation issues, uncertainty in strategy choice, and uncertainty stemming from cultural differences.

While we hope to have provided practitioners, educators, and researchers alike with a comprehensive overview of different kinds of uncertainties that negotiators may face, as well as approaches to overcome them, we call on the research community to investigate the role of uncertainty in negotiations more vigorously. Importantly, empirical investigators should

acknowledge the key role that negotiation experience (e.g., Murnighan et al. 1999) and negotiation training (Zerres et al. 2013) play when investigating how negotiators perceive and deal with uncertainty. After all, no matter the domain of the negotiation (e.g., business, political, or legal), uncertainties are omnipresent. For negotiators to negotiate more effectively, it can be crucial that they understand the psychological barriers to which they are likely to fall prey when confronted with uncertainty. In fact, when it comes to high-stakes negotiations—such as those involving the availability of vaccines during pandemic times—understanding the effects of uncertainty in negotiations can quite literally save lives.

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NOTES

1. In this article, we use the generic term *uncertainty* whenever talking generally about outcomes that do not occur with certainty. Whenever a distinction between *risk*, *ambiguity*, and *uncertainty* in a mathematical sense is needed, we use the appropriate terms.

2. As pointed out by our kind reviewer, negotiating about the negotiation might entail the employment of a third-party mediator. We expect the effect of a mediator to be similar, meaning that using a mediator reduces differences in issue-based interpretations, thereby reducing uncertainty.

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