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By Chios Carmody[1]

1. Introduction

Law is about many things, but at base it is about rights and obligations. In classic thinking a single right is offset by the jural correlative of an obligation. The strength of that offset is referred to as the law's normativity.

The jural correlation mentioned above is established and sustained by means of reasoning. We hold that an actor has a right or obligation by virtue of reasoning that classically occurs in one of two forms. An obligation creates a right by means of inductive logic that rests on the conviction of similar instances in the past and the need for proof. Under international law, for instance, proof of an armed attack gives rise to a right of self-defence.[2] The foundation for the rule is found in experience wherein such attacks are considered inimical to the territorial integrity, sovereignty and survival of states. Similarly, the law creates an obligation by means of deductive logic, that is, the process of reasoning from one or more statements (premises) that are used to reach a logically certain conclusion. Under international law, for instance, there appears to be a presumption of compliance with international law.[3] We assume it unless there is proof to the contrary.

The matched pairing of induction and deduction has been present in law and international law for a long time. The pairing is attractive because it infers a certain symmetry and logical harmony. The emphasis in inductive logic on past instances of behaviour is offset by the prospectivity of deductive logic. The reductivism and empiricism of induction is 'contractual' in nature and is offset by the rationalism of deductive logic in projecting a rule into the future, something which more 'constitutive'. The demand for proof in inductive logic has a connection with rights inasmuch as in most instances the exercise of rights demands evidence, and likewise, the insistence on mental models in deductive logic can be related to obligation insofar as it is linked to what is required. Conceptual models underpinning deductive logic are followed out of a sense of obligation.

Taken together, the dyads I have referred to might suggest a neat balance. The two modes of reasoning appear in equipoise. However, looked at from the vantage point of a legal system as a whole, a certain inequality becomes manifest. The retrospectivity, contractualism and rights-orientation of induction can be understood to take place within the greater envelope, or 'shell' of, prospectivity, constitutionalism and obligation. Actors would not have rights or the ability to contract about anything unless they at first shared something in common, a common set of obligations that may be likened to a constitution. So there is between deductive and inductive logic actually *an imbalance*, one in which deduction is primate and induction subordinate (i.e. Deduction > Induction). And of course, all of this presupposes a community. In the law of the World Trade Organization the community is composed, first and foremost, of member states which exercise rights and obligations in the system. In international law the community is less well defined, although again, at a minimum it can be understood to consist of states which hold plenary status in the international legal order.[4]

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[2] International law recognizes a right of self-defence by countries, as affirmed by the International Court of Justice (ICJ) in the *Nicaragua* Case. This right is spelled out in UN Charter Art. 51 which states that "Nothing in the present Charter shall impair the inherent right of collective or individual self-defense if an armed attack occurs against a member of the United Nations … ". The traditional position is that Art. 51 only preserves this right when an armed attack occurs. Another interpretation maintains that Art. 51 does not supplant the inherent right of self-defense so that self-defense is still permissible in situations where an armed attack has not actually occurred. For discussion see Bruno Simma (ed.), *The Charter of the United Nations: A Commentary*, Vol. 1 792-794 (2002).

[3] On the subject of a presumption of compliance with international law Robert Jennings and Arthur Watts observe that "The question is really whether the law itself is a sufficient test compliance with international obligations, or whether what matters is action actually taken in pursuance of the law. It is probable that no one answer applies to all situations." *Oppenheim's International Law* (9th ed.) Vol. 1 85 (1996). Their uncertainty is countered by evidence that common statements of international law like the International Law Commission's Draft Articles on State Responsibility make clear that certain requirements, like conduct, attribution, breach, and the absence of circumstances precluding lawfulness, are all necessary for international responsibility, and the fact that domestic courts routinely presume against conflicts between domestic and international law. *Oppenheim's International Law* (9th ed.) Vol. 1 81 (1996).

[4] Christine Chinkin & Alan Boyle, *The Making of International Law* 15-17 (2007).

What has intrigued some commentators surveying the dualism of deductive and inductive logic in legal reasoning is the possibility of some other form of reasoning, a third order of logic. A number of commentators are prone to regard deduction and induction as co-terminous, essentially exclusive and exhaustive.[5] The two classical forms of reasoning admit of nothing else. Some commentators, however, have identified something additional. It stands to reason that if there are conventionally two modes of logic operating in any one moment, then their combined operation across *all* moments should create a third thing, or *tertium quid*, as their product. This product, I will submit, is abductive reasoning.

Abductive reasoning is thought to have been first identified by the American philosopher Charles Saunders Pierce (1839-1914) and is commonly considered to be "a technique used to narrow down the number of alternatives by picking out one or a few hypotheses from a much larger number of them …"[6] It is often called "an intelligent guess"[7] and is "equated with inference to the best explanation."[8] For this reason abductive reasoning appears to be distinct from inductive reasoning, which is the *most probable* explanation. Still, abductive reasoning is "a guess because it is tied to an incomplete body of evidence. As new evidence comes in [over time], the guess could be shown to be wrong."[9] Abductive reasoning stresses the tentative, open-ended nature of knowledge in the present. It is the best explanation *right now*. This provisional quality makes abductive reasoning distinct from deduction, which emphasizes a certain inference projected into the future. Abductive reasoning is sometimes referred to as the logic of what 'might be'.

An example of an abductive argument used by Pierce runs as follows:

> The Four Horseman Example
> I once landed at a seaport in a Turkish Province; and as I was walking up to the house which I was to visit, I met a man upon horseback, surrounded by four horseman holding a canopy over his head. As the governor of the province was the only personable I could think of who would be so greatly honoured, I inferred that this was he. This was an hypothesis.[10]

Abductive reasoning is therefore hypothetical reasoning, subject to revision as new information becomes available. Some authorities have noted its role in the law of evidence. John Henry Wigmore (1863-1943), the American authority on evidence, "was quick to pick up on the importance of this kind of reasoning in legal evidence judgments, and he applied the idea to the reasoning used in many typical legal cases in a very helpful and convincing way."[11] Wigmore employed the following illustration of abductive reasoning in law:

> The fact that before a robbery someone had no money, but after had a large sum, is offered to indicate that he by robbery he became possessed of the large sum of money. There are several other possible explanations – the receipt of a legacy, the payment of a debt, the winning of a gambling game, and the like. Nevertheless, the desired explanation rises, among other explanations, to a fair degree of plausibility, and the evidence is received.[12]

Nevertheless, the importance of abductive reasoning in law is rarely recognized. It has been little mentioned or discussed. Experts in legal reasoning even have difficulty saying with certainty how it arises. Even today it

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[5] For example J.S. Covington, Jr., *The Structure of Legal Argument and Proof* (1993), who observes confidently that "[t]here are two forms of reasoning and therefore two forms of argument." Ibid., p. 2. He goes on to refer to abductive logic in an accompanying footnote as follows: "Some writers include a third form of reasoning called "abduction". Abduction is similar to induction, since it results in their creation of new hypotheses, but abduction does so on one datum [i.e. data set]. It is an intelligent guess on very limited information about what a hypothesis may be, and the guess leads to the search for data to confirm the new hypothesis." Ibid., p. 2, n. 1.
[6] Douglas Walton, *Abductive Reasoning* 9 (2004) [hereinafter *Walton*].
[7] Ibid., p. 3.
[8] Ibid., p. 4.
[9] Ibid., pp. 3-4.
[10] Ibid., p. 5.
[11] Ibid., p. 23.
[12] Wigmore's example originally appeared in John H. Wigmore, *A Treatise on the Anglo-American System of Evidence*, Vol. 1 (3rd ed.) (1940). It is reproduced in *Walton*, supra, note 6 at 25.

remains poorly understood.[13]

These preliminary points reveal at least three problems with the identification of abductive logic in law. First, where does it come from? Is it a fusion of deductive and inductive reasoning, or is it entirely separate from them? Second, what does it look like within the workings of an actual legal system? How does it display and what are its consequences? Finally, what are some issues with abductive logic that might inhibit its broader acceptance?

My answers to these questions are drawn from experience with WTO law. That experience suggests that abductive logic is indeed a fusion of deductive and inductive reasoning, not separate and apart from them. An abductive pattern of reasoning rests on models that are tested by experience, leading to modifications in the model, followed by more experience, leading to further modifications, and so forth. We can think of this pattern as an example of a kind of logical reflex or spiral.

WTO law contains some marked examples of the interaction of deductive and inductive logic that culminate in abduction. The experience suggests that, at the end of the day, reasoning – and indeed knowledge – are provisional. It also explains some of the open-endedness of comments made in WTO decisions, such as the observation in *Japan – Alcoholic Beverages II* that "WTO rules are not so rigid or so inflexible as not to leave room for reasoned judgements in confronting the endless and ever-changing ebb and flow of real facts in real cases in the real world."[14]

At the same time, abductive logic suffers from a number of defects which inhibit its wide acceptance. As a fusion, it is the product of opposable thinking which demands that we hold directly conflicting concepts in mind. It is hard to reason abductively. Second, abductive logic is generated over time through the examination of competing accounts. Its gradualism and immanence are at odds with the fact that so often in legal reasoning we are focused on the moment and want the certainty of fixed rules. Third, abductive logic is uncomfortable because it questions certainty. Its provisionality means that actors can never been completely sure about the reasoning they use to ascribe responsibility. They must constantly search for something better.

2. Reasoning in WTO Law

Reasoning in WTO law can appear obscure. The WTO Agreement was concluded in 1994 and is said to represent a significant "thickening of legality"[15] as compared with GATT 1947. The treaty is primarily about the protection of expectations and is generally an instrument of obligations as opposed to rights.[16] The emphasis on obligation in WTO law means that the law places a special priority on automaticity, that is, the ability to do things relatively quickly and without much investigation into detail.

Perhaps the most important feature in the scheme of the legal system is compliance. Hence, many matters have to be assumed or presumed, or in other words, reasoned deductively. There is, for instance, the lynchpin presumption that a breach of the rules by one WTO member has an adverse impact on other WTO members. Likewise, there are presumptions in WTO law against conflict within the treaty[17], of consistent usage[18], of differential usage[19], and against retroactivity.[20] In addition, there is the general presumption in WTO law that a

[13] Walton observes that "Wigmore's use of abductive inference in his analysis of legal evidence suggests emphatically that the abductive model is highly applicable to legal reasoning. In the past, the notion of abduction has not been widely know to experts on legal logic and legal evidence, and much of their work has centered on deductive and inductive models of rational argument. But even a glimpse of Wigmore;s work on evidence shows the enormous potential of abduction as applied to the logical structure of reasoning in legal evidence." Ibid., pp. 25-26.
[14] *Japan – Alcoholic Beverages*, WT/DS8/AB/R, p. 31 (4 Oct. 1996).
[15] *India – Quantitative Restrictions*, WT/DS90/R, para. 5.101 (6 April 1999).
[16] This protection often expressed in terms of "security and predictability". Thus, for instance, in *EC – Computer Equipment*, WT/DS62, 67, 68/AB/R (5 June 1998) the Appellate Body stated, "We agree with the Panel that the security and predictability of "the reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and other barriers to trade" is an object and purpose of the *WTO Agreement*, generally, as well as of the GATT 1994." Ibid., para. 82. See also *EC – Selected Customs Matters*, WT/DS315/R, para. 6.34 and see comments at para. 7.431 (16 June 2006).
[17] Jeff Waincymer, *WTO Litigation* 465-66 (2002).
[18] Ibid., 468.
[19] Ibid., 469.

country conforms with its international obligations, a specification of the general presumption of good faith found in VCLT Art. 26.[21]

Yet deduction is not its only form of reasoning in WTO law. WTO law can also be said to take account of existing fact, or what is or 'was', sometimes expressed in the demand for "positive evidence".[22] The demand is especially noticeable in WTO rules disciplines – safeguard, countervail and anti-dumping review – where the law has to 'get at' what has happened previously. The inquiry is conducted in order to properly assess whether a national investigating authority has complied with the WTO Agreement in making its findings and exercising the rights attendant thereto.

The great difficulty with inductive reasoning in WTO law, however, is the constrained nature of WTO fact-finding. Panels are obliged to make an "objective assessment" of matters, but this takes place within a system of dispute settlement, a term which suggests that while adjudication is tasked with the job of resolving individual "disputes", its ultimate aim is "settlement". For this reason, counterclaims are prohibited.[23] Most notably, the system lacks a mechanism for compulsory discovery.[24] Evidentiary concerns assume lesser importance.[25]

Furthermore, in the operation of inductive standards a curious phenomenon is observed to occur. The demand for proof *becomes* a presumption.[26] In effect, inductive reasoning transitions to its notional opposite in deductive reasoning – and vice versa. This phenomenon suggests that at their outer limits, inductive and deductive reasoning are linked.

All of this is very interesting because it is to be contrasted with the situation in international investment law - a body of law with which WTO law is often compared – where proof of loss is usually required, meaning that the law is heavily inductive.[27] It also differs from the position in public international law generally where the International Law Commission has observed in relation to the all-important issue of causation of injury, for

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[20] Ibid., 477.

[21] *Argentina – Peach Safeguards*, WT/DS238/R, para. 7.142 (14 Feb. 2003) ("… we must presume that all Members will comply with their obligations under the covered agreements in good faith …"); *Brazil – Aircraft*, WT/DS46/RW/2, para. 5.124 (26 July 2001); *Chile – Alcoholic Beverages*, WT/DS87, 110/AB/R, para. 74 (13 Dec. 1999).

[22] The Appellate Body has described "positive evidence" as "the quality of the evidence that authorities may rely upon in making a determination [that must be] of an *affirmative, objective and verifiable character*, and … must be credible." *U.S. – Hot Rolled*, WT/DS184/AB/R, para. 192 (24 July 2001).

[23] DSU Art. 3.10 provides ""[i]t is also understood that complaints and counter-complaints in regard to distinct matters should not be linked." Notwithstanding this, tit-for-tat litigation has been observed in WTO dispute settlement and is not uncommon. See the Brazil-Canada Aircraft cases (WT/DS46, WT/DS70), the EU-U.S. Large Aircraft ("Airbus/Boeing") cases (WT/DS316, WT/DS353), *EC – Commercial Vessels*, WT/DS301/R, para. 7.127 (22 Apr. 2005) (litigation initiated by Korea against EC legislation, the TDM Regulation, making a link between temporal application of the Regulation and the initiation, resolution or suspension of WTO dispute settlement proceeding initiated by the EC against Korea regarding subsidies allegedly provided by Korea to its shipbuilding industry), and the pair of cases *Guatemala – Cement*, WT/DS60/R (19 June 1998) and *Mexico – Steel Pipes*, WT/DS331/R (8 June 2007).

[24] As noted in *Chile – Alcoholic Beverages*, WT/DS87, 110/R, para. 6.26 (15 June 1999).

[25] Within the dispute resolution process, for instance, panels and the Appellate Body have emphasized the "shared responsibility" of litigants to resolve disputes and the duty upon parties to cooperate in attempting settlement. "… both the suspending Member and the implementing Member *share the responsibility* to ensure that the suspension of concessions is not applied indefinitely": *Canada – Continued Suspension*, WT/DS321/AB/R, para. 348 (16 Oct. 2008) [emphasis added].

[26] An example of the 'transition' from inductive logic to deductive logic occurs in the establishment of an "all others" anti-dumping rate under WTO Anti-dumping Agreement Art. 6.10. Here, the general rule is stated that in anti-dumping investigations "[t]he authorities shall, as a rule, determine the *individual* margin of dumping for each known exporter or producer concerned …". The rule mandates an empiric exercise in the determination of an individual margin for entities that are alleged to dump. However, the article goes on to state:

> In cases where the number of exporters, producers, importers or types of products involved is so large as to make such a determination impracticable, the authorities may limit their examination either to a reasonable number of interested parties or products by using samples which are statistically valid …

This paragraph describes the establishment of an "all-others" rate, which can be understood as a *presumptive* rate characteristic of deductive logic. There has been litigation over the extent to which the presumption should apply. See for instance *EC – Bed Linen*, WT/DS141/RW (29 Nov. 2002). Some evidence also exists of shifts from deduction to induction in other situations. See for instance *India – Patents*, WT/DS50/AB/R, para. 19, where the where the logic of presumption is sustained by reference to proof ("the Panel found that at least one United States' company had satisfied the steps required for the grant of exclusive marketing rights, but had not applied for them in India because it could not obtain information regarding the appropriate procedure for doing so.")

[27] Borzu Sabahi, *Compensation and Restitution in Investor-State Arbitration* 184 (2011).

instance, that "there is no general requirement … that a State should have suffered material harm or damage before it can seek reparation for a breach."[28] There is, in other words, no general rule about reasoning in public international law. The primary rule can reason deductively or inductively.

The combination of deductive and abductive reasoning is abductive. That is because not being absolutely certain of knowing what 'will be' (i.e. deduction), a decision-maker takes note of what 'was' (i.e. induction) to arrive at a hypothesis of what 'might be' in the present (i.e. abduction). The basic movement is a kind of reflexivity, or perhaps more accurately, a spiral in which the theory underpinning a rule is adjusted (or sometimes overturned) to take account of new information. As mentioned, abduction offers the "best" or most intelligent explanation on existing evidence, with the proviso that the hypothesis might change as new information becomes available.

The overarching quality of abductive logic is apparent in several WTO cases. In *U.S. – FSC*, for instance, a compliance panel had to determine whether certain amounts "otherwise due" were "foregone" for the purposes of the definition of a subsidy in SCM Art. Art. 1.1(a)(1)(ii).[29] The panel observed that determining what was "otherwise due" was not only ascertainable "where a purely mechanical exercise of inspection was feasible" since this would give a defendant country "every reason to ensure that there was no automatic or explicit link to the situation of what would otherwise be due."[30] Hence, the panel refused to be limited to a strictly inductive inquiry. At the same time, the panel noted that a purely deductive approach would be undesirable as well. The panel concluded that it would be impossible "simply to assert that revenue is otherwise due in the abstract. It cannot be *presumed*."[31] An intermediate approach "grounded *in the actual way* in which the U.S. tax regime functions"[32] was called for, one that looked "at the overall situation as *an integrated whole*."[33] Based on an abductive approach, the panel concluded that treating the overseas income of certain U.S. manufacturers as non-taxable led to "the foregoing of revenue otherwise due", as prohibited under the SCM[34]

Another example of abductive reasoning occurred in *Brazil – Tyres*.[35] In that case, the EC brought a challenge against a ban on tire imports maintained by Brazil for environmental purposes. The ban prohibited tire imports generally, but made an exception for tires from MERCOSUR countries. Brazil defended its differential treatment under GATT Art. XX(b) as "necessary to protect human, animal or plant life or health." The panel noted that under this 'MERCOSUR exception' imports did not appear to have been significant and therefore did not result in "unjustifiable discrimination", as prohibited by the preamble of GATT Art. XX. The panel backed this opinion up with reference to Brazil's foreign trade statistics.[36] The panel's analysis was therefore empiric and inductive.

On appeal, the Appellate Body faulted the panel for its interpretation of "unjustifiable", complaining that the panel's analysis was too empiric. The Appellate Body stated: " … analyzing whether discrimination is "unjustifiable" will usually involve an analysis that relates primarily to the cause and rationale of the discrimination. By contrast, the Panel's interpretation of the term "unjustifiable" does not depend on the cause or rationale of the discrimination but, rather, is focused exclusively on the assessment of the *effects* of the discrimination."[37] The Appellate Body concluded "[t]he Panel's approach has no support in the text of Article XX and appears to us inconsistent with the manner the Appellate Body has interpreted and applied the concept of "arbitrary or unjustifiable discrimination" in previous cases."[38] The Appellate Body went on to hint at a

[28] James Crawford, *Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries* 92 (2008).
[29] SCM Art. 1.1(a)(1)(ii) provides that for the purposes of the SCM "a subsidy shall be deemed to exist if … (ii) government revenue that is otherwise due is foregone or not collected (e.g. fiscal incentives such as tax credits)".
[30] WT/DS108/RW, para. 8.14 (20 Aug. 2001).
[31] WT/DS108/RW, para. 8.17 (20 Aug. 2001) [emphasis added].
[32] WT/DS108/RW, para. 8.25 (20 Aug. 2001) [emphasis added].
[33] WT/DS108/RW, para. 8.23 (20 Aug. 2001) [emphasis added].
[34] WT/DS108/RW, para. 8.26 (20 Aug. 2001).
[35] *Brazil – Retreaded Tyres*, WT/DS332/R (12 June 2007).
[36] Ibid., para. 7.288.
[37] WT/DS332/AB/R (3 Dec. 2007) [emphasis in original].
[38] The Appellate Body observed "… we recognize that in certain cases the effects of the discrimination may be a relevant factor, among others, for determining whether the cause or rationale of the discrimination is acceptable or defensible and, ultimately, whether the discrimination is justifiable. … Taking into account as a relevant factor, among others, the effects of the discrimination for determining whether the rationale of the

hybrid quantitative *and* qualitative approach to the issue discrimination, noting that effects are merely "a relevant factor [in discrimination analysis], among others … ".[39] A hybrid analysis of quantitative and qualitative factors, of inductive and deductive, is observed in a number of other WTO cases.[40]

The abductive character of reasoning under the WTO Agreement is probably one reason why, on the one hand, panels and the Appellate Body have been so careful to tailor their observations to the specific facts before them, thereby suggesting that the law is clarified and known only episodically.[41] It has a quicksilver quality. The outcome can change in an instant depending on the particular legal and factual matrix. On the other hand, the Appellate Body has occasionally made statements indicative of the open-ended nature of WTO law and its analysis. Mention has already been made of the need referenced in *Japan – Alcoholic Beverages II* to "confront[] the endless and ever-changing ebb and flow of real facts in real cases in the real world."[42] Or as was mentioned in *EC – Hormones*, where the Appellate Body reminded that the risk to be evaluated in risk assessment is not the purely abstract one identifiable in a laboratory, but also "in human societies as they actually exist, in other words, the actual potential for adverse effects on human health in the real world where people live and work and die."[43]

In other words, there is a healthy appreciation of the need to take both deductive and inductive reasoning into account in the logic of WTO law. Perhaps because it does so, WTO law is moderately more adaptive and better able to evolve than international investment law, which remains deeply controversial and adapts only spasmodically.

3. Some Concluding Observations

The foregoing analysis has been designed to illustrate what abductive logic is, how it manifests itself in the workings of a legal system, and what additional insights it may offer. Abductive logic is a marriage – or fusion – of the two well-known forms of logic. It is deductive in its reliance on pre-existing presumptions or assumptions underpinning WTO law. It is inductive in testing these suppositions against proof. The interplay between them over time is reflexive and reflective, producing spirals of change in the law.

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discrimination is acceptable is, however, fundamentally different from the Panel's approach, which focused exclusively on the relationship between the effects of the discrimination and its justifiable or unjustifiable character." Ibid., para. 230. The Appellate Body later added that the panel's "quantitative approach - according to which discrimination would be characterized as unjustifiable only if imports under the MERCOSUR exemption take place in such amounts that the achievement of the objective of the measure at issue would be "significantly undermined" - is flawed." Ibid., para. 247.

[39] WT/DS332/AB/R, para. 230 (3 Dec. 2007).

[40] For instance in *Korea – Alcoholic Beverages II*, WT/DS/AB75/R (18 Jan. 1999), the Appellate Body eschewed a rigid quantitative analysis. It specifically noted that "an approach that focused solely on the quantitative overlap of competition would, in essence, make cross-price elasticity *the* decisive criterion in determining whether products are 'directly competitive and substitutable'". Ibid., para. 134 [emphasis in original]. It also observed, "we share the Panel's reluctance to rely unduly on quantitative analyses of the competitive relationship." Ibid. In *Chile – Alcoholic Beverages*, WT/DS87/R (13 Dec. 1999) the panel examined similar factors and noted, somewhat impressionistically, that "when a product is being marketed in ways that suggest that it is in competition with the most upmarket imported distilled products, this is evidence of at least potential competition with those imports." No quantification of this "potential" was provided. Similarly, in *Philippines – Distilled Spirits*, WT/DS396/R (15 Aug. 2011) the panel found that the products in question, certain imported spirits, were both like and competitive with domestic Philippine products. As part of its analysis, the panel examined several studies put forward by the parties, but noted the difficulty of using econometric studies with limited historical price data. More broadly, on the issue of the protective application of a measure, as prohibited by GATT Art. III:1, in *Japan – Alcoholic Beverages*, WT/DS8/AB/R (4 Oct. 1996), the Appellate Body held that "[the] protective application [of a measure] can most often be discerned from the design, the architecture, and the revealing structure of a measure. The very magnitude of the dissimilar taxation in a particular case may be evidence of such a protective application, as the Panel rightly concluded in this case. Most often, there will be other factors to be considered as well. In conducting this inquiry, panels should give full consideration to all the relevant facts and all the relevant circumstances in any given case." It labelled this approach a "comprehensive and objective analysis". Ibid. Similarly, in *Chile – Alcoholic Beverages*, WT/DS87/AB/R, para. 71 (13 Dec. 1999), the Appellate Body added in a broad-brush way that "a measure's purposes, objectively manifested in the design, architecture and structure of the measure, *are* intensely pertinent to the task of evaluating whether or not that measure is applied so as to afford protection to domestic production." Ibid., para. 71 [emphasis in original]. Noteworthy in all these examples is the way the analysis attempts to be as comprehensive as possible (e.g. "all the relevant facts and all the relevant circumstances"). The mode of reasoning is based on what is known in the present.

[41] Hence, numerous references in WTO case law to the need for analysis on a "case-by-case" basis. See for instance *Canada – Dairy (21.5)*, WT/DS103, 113/AB/RW, para. 115 (3 December 2001) (noting for instance that "the existence of such a demonstrable link [between government action and WTO-inconsistent payments] must be identified on a *case-by-case basis*, taking account of the particular governmental action at issue and its effects on payments made by a third person."

[42] *Japan – Alcoholic Beverages II*, WT/DS8/AB/R, p. 31 (4 Oct. 1996).

[43] *EC – Hormones*, WT/DS26/AB/R, para. 187 (16 Jan. 1998).

For all of its pervasiveness, however, there are some serious difficulties with abductive logic. The modes of reasoning I have discussed – deduction and induction - are opposed. Their reconciliation requires a transcendental perspective, one that is comfortable integrating antithetical ideas *over time*. One source on opposable thinking has observed:

> Once you start integrating things, you end up with a much more complex problem than you had before. It's harder to work with. Things are more in flux. You get more interactions between things, so the knowledge has to be more robust.[44]

The advantage offered by opposable thinking is insight. The oppositions highlighted by the theory are not meant to complicate the analysis so much as to reveal their true depth in order to gain leverage for new ideas and answers.

A second difficulty with abductive logic is its bivalence. Being founded in alternating forms of presumption and proof, it is open to uncertainty. Should a given rule of legal liability be based on presumption or proof? It depends. For instance, under the WTO Technical Barriers to Trade (TBT) Agreement countries are encouraged to use international standards in the formulation of regulations, standards, testing and certification procedures and to avoid unnecessary barriers to trade. However, even if a technical regulation is non-discriminatory, it could still fall afoul of the TBT Agreement because it restricts trade unnecessarily. The Agreement says that technical regulations shall not be more trade-restrictive than necessary to fulfil a legitimate objective, and that account must be taken of "the risk of non-fulfilment". This issue may be seen as involving a degree of proportionality between a measure's trade restrictiveness and the risk that the measure seeks to mitigate. The case law reveals that an evaluation of proportionality involves several factors, including how much the measure contributes to the achievement of the objective, the types of risks and the potential consequences from the non-fulfilment of the objective, and the trade-restrictiveness of the measure. Considering alternative measures put forward by the complainant is also part of the assessment. Is this reversal of the onus presumption- or proof-based?[45] It appears presumptive. That is, the law presumes a country's legitimate right to regulate and that presumption is maintained unless there is an alternative that is significantly less trade-restrictive, which is itself an assessment that is largely presumptive. Again, WTO law again appears heavily deductive. We assume many things because of the law's concern at this particular juncture with safeguarding sovereignty and policy space. After all, the TBT Agreement is fundamentally about the right of a country to regulate and it can be hard to see abduction in all of this unless we view it at the proper degree of abstraction.

A third difficulty with abduction is its provisional character. By its very nature, abductive logic points to the shortcomings of existing knowledge. It is what is available "at least for now, and until new information comes in."[46] To that extent, abductive logic is disquieting because it infers the constant need to search for something better, more complete.

Instances of incompleteness in reasoning are hard to spot *ex ante* in WTO law. Perhaps the greatest contemporary challenge to its reasoning is the fact that the growing economic disparity experienced in many WTO member countries recently runs counter to the reference in the WTO Agreement preamble to "to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand". Simply put, existing evidence seems to strike at the very core of the treaty's key promise. At the same time, without being endowed with the appropriate policy tools, it is difficult to see how WTO law might be refashioned to better achieve inclusive growth.[47]

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[44] Roger Martin, *The Opposable Mind* 80 (2007).

[45] For instance in *US – Clove Cigarettes*, WT/DS406/R, para. 7.418 (2 September 2011) WTO adjudicators found that Indonesia had not demonstrated that there were less trade-restrictive alternatives available to the United States, and that the measure could indeed make a "material contribution" to the U.S.'s objective of reducing youth smoking by banning clove cigarettes.

[46] David Schmidtz, *Elements of Justice* 28 (2006).

[47] The World Economic Forum describes inclusive growth as "output growth that is sustained over decades, is broad-based across economic sectors, creates productive employment opportunities for a great majority of the country's working age population, and reduces poverty." See World Economic Forum, *The Inclusive Growth and Development Report 2015* 1 (Sept. 2015). In this connection the OECD's Inclusive Growth

Initiative 2012 determined that GDP per capita may not be sufficient to generate sustained improvements in societal welfare and that a broader conception of living standards is required. Beyond income and wealth, people's well-being is shaped by a range of non-income dimensions such as their health, educational, and employment status.