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Rethinking mistake in the age of Algorithms: Quoine Pte Ltd v B2C2 Ltd

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Rethinking Mistake in the Age of Algorithms: *Quoine Pte Ltd v B2C2 Ltd*

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Good traders remove emotion from the decision-making process. Automated trading algorithms have enabled this, allowing one to trade round the clock, and without the constant need to monitor one's investments. But software has gremlins. Given the vast amounts of money involved in such trades, it was only a matter of time before disputes involving automated trading software came before the courts. The decision in *Quoine v B2C2* ('**Quoine**')[1] represents the first time an apex court in the Commonwealth has ruled on the applicability of contractual principles to situations involving automated trading software.

Central to the dispute were several trades executed between B2C2 Ltd (the '**Respondent**') and the counterparties on the trading platform operated by Quoine Pte Ltd (the '**Appellant**'). These trades were all executed via automated trading algorithms. The counterparties and the Appellant were unaware as to the specific terms on which the contracts were concluded.[2] To place an order on the exchange, the Respondent's algorithm first had to generate an 'output price'. The generation was done by first obtaining data of the 20 best sell or buy orders from the Platform's order book, being one of the variables for the series of trading strategies contained within the Respondent's algorithm. Without data from the Platform, the Respondent's algorithm would cease to work. Seeking to pre-empt this, Mr Boonen, a director of the Respondent, inserted a 'virtual price' of 10 BTC to 1 ETH for sell orders for ETH. The 'virtual price' would apply if

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1 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02.

2 *Quoine*, [96].

there was no or insufficient input from the Platform, enabling the Respondent's algorithm to continue running.

As things transpired, this was exactly what happened. Because of an oversight, the Appellant's market-making programme could not access external market prices from other exchanges. ETH/BTC orders were not created on the Platform. However, because no error message was generated, this went unnoticed. Trading on the Platform fell to abnormally thin levels. This triggered margin calls on the Counterparties' accounts. Consequently, market orders were placed on their behalf to buy ETH at the best available market price which happened to be that offered by the Respondent.

Because the Platform was not configured to check whether the Counterparties had sufficient funds in their account, the Counterparties were allowed to trade more BTC than they had in their account, and at abnormally high prices. The Appellant reversed these trades on grounds that they represented an abnormal deviation from the previous BTC/ETH rate. The Respondent sued the Appellant for (a) breach of contract, alleging that they had no right to unilaterally reverse the trades and (b) breach of trust, alleging that the Appellant had unilaterally removed BTC from its account after reversing the trades.

The case came before Thorley IJ in the Singapore International Commercial Court ('**SICC**') at first instance in the case of *B2C2 Ltd v Quoine Pte Ltd* ('***B2C2***').[3] Responding to the Respondent's claim, the Appellant argued that it was entitled to reverse the trades on grounds: (1) of terms implied in the 'Terms and Conditions' stated on their website, and/or (2) of express terms in the agreement governing use of the Platform read in conjunction with the risk disclosure statement on its website. It further argued that the contracts were void or voidable under the doctrine of (3) unilateral mistake at common law; (4) unilateral mistake in equity; (5) mutual mistake; and/or (6) unjust enrichment.

All six defences were rejected. Thorley IJ held that the Appellant could not reverse the trades on the basis of express or implied terms. Further, the doctrine of unilateral mistake at common law or equity did not void the contracts. There was no knowledge on the part of the programmer, Mr Boonen, as to the mistake. The doctrine of mutual mistake also did not apply to the present case. Finally, there was no unjust enrichment.

On appeal, substantially the same arguments were mounted but found no favour with the majority in the Court of Appeal, which affirmed Thorley IJ's decision. The majority affirmed Thorley IJ's characterisation of the contractual relationships; that the Trading Contracts were formed directly between the Respondent and the Counterparties as this accorded with the terms of the agreement governing use of the Platform.[4] Moreover, the majority also affirmed Thorley IJ's finding that the Appellant was not entitled to cancel the disputed trades on the basis of express or implied terms.[5]

3 *B2C2 Ltd v Quoine Pte Ltd* [2019] 4 SLR 17.
4 *Quoine*, [50]–[55].
5 *Quoine*, [61]–[62], [74]–[77].

Dealing next with the Appellant's defence of unilateral mistake, the majority held that because the Respondent's software was not coded with the intention of taking advantage of a mistaken bid by a counterparty, the doctrine of unilateral mistake at common law did not apply.[6] The Appellant's defence of common mistake also failed because the Respondent's deliberate programming of the virtual prices of ETH/BTC meant that they were not mistaken as to price. Having found that there was no unilateral or common mistake, the Appellant's claim of unjust enrichment also failed. There could not have been unjust enrichment given that the Respondent's windfall was the result of valid contracts. The sole dissent came from Lord Mance who disagreed with the majority on the application of the doctrine of unilateral mistake. In Lord Mance's view, the claim that the transactions were voidable for unilateral mistake in equity should have succeeded and he would have allowed the appeal.[7]

The majority disagreed with Thorley IJ on the issue of whether a trust had been created, holding that, even assuming that BTC could be the subject of a trust, there was no trust created over the BTC in the Respondent's account. Although Thorley IJ had ruled that cryptocurrencies were property, the majority declined to express a definite opinion, holding instead that the breach of trust claim failed because there was no certainty of intention.[8]

OBSERVATIONS

The majority began their analysis by defining the type of trading software employed by the Respondent as deterministic. Such software would 'always produce precisely the same output given the same input'[9] and did not have the capacity to develop its own responses to varying conditions. The majority also noted that while legislative intervention to regulate algorithmic trading might eventually be appropriate, they considered that the existing body of law could be adapted to deal with such cases at the moment.[10]

Both the majority and Lord Mance agreed that the case before them was not one of unilateral mistake at common law.[11] However, the Singapore position, which differs from that in England, recognises the doctrine of unilateral mistake in equity.[12] This requires (a) that the non-mistaken party have constructive notice of the error, (b) the presence of sharp practice or unconscionable conduct and (c) an element of impropriety before equitable jurisdiction could be invoked to set aside the contract.[13] While the

6 *Quoine*, [123].
7 *Quoine*, [207].
8 *Quoine*, [144].
9 *Quoine*, [15]. 'Input' in this context should be taken in a broad sense to include the surrounding conditions under which the software is operating.
10 *Quoine*, [79].
11 *Quoine*, [114]–[116] (see Lord Mance at [182]).
12 *Chwee Kin Keong v Digilandmall.com Pte Ltd* [2005] 1 SLR(R) 502, [74].
13 *Ibid*, [77].

majority and Lord Mance were in agreement that the doctrine of unilateral mistake was applicable to cases involving automated trading algorithms,[14] they parted ways as to the manner in which it was to be applied.

The first point of disagreement related to the element of constructive knowledge. The majority held the view that the relevant knowledge was that of the programmer or person running the programme, and it was to be assessed from the point of programming up to the point where the contract was formed.[15] This was because there could be situations where the mistake was not contemplated at the point of programming but came to mind later, before the contract was formed.[16] In doing so, the court rejected the Appellant's argument that equity should intervene based on a review of the reasonableness of the ensuing contract after its formation without any mistake as to its terms.[17] Therefore, the key inquiry was whether the non-mistaken party ought to have known of the type of mistake and acted to take advantage of it.[18]

In contrast, Lord Mance opined that it did not matter whether the non-mistaken party had assumed knowledge of the mistake at the time of the transactions or 'prophetically in advance'.[19] Relief should be available once it would 'have been perceived that some fundamental error had occurred'.[20] According to Lord Mance, this would parallel situations of actual knowledge rather than constructive notice.[21] The reason for this modified approach was that in typical cases of unilateral mistake, the enquiry focussed on 'the actual state of mind and conduct of human beings involved in the making of the contract'.[22] However, this was an impossible enquiry in the context of contracts formed between two automated trading algorithms. That said, where contracts are concluded entirely by algorithms, it may still be possible to determine knowledge on the part of the contracting parties to allow the operation of the doctrine of mistake. As the majority pointed out, this knowledge can be determined by assessing the state of mind of the programmer or the person running the programme.[23]

Finally, both the majority and Lord Mance discussed how the element of unconscionable conduct might apply. The majority held that unconscionable conduct was a requirement for establishing unilateral mistake in equity in the present case[24] and, citing the decision in *BOM v BOK*,[25] preferred a narrower conception of unconscionability, arguing that it 'limits excessive subjectivity in determining what amounts to

14 *Quoine*, [97], [193].
15 *Quoine*, [99].
16 *Quoine*, [99].
17 *Quoine*, [104].
18 *Quoine*, [102]–[103].
19 *Quoine*, [194].
20 *Ibid*.
21 *Quoine*, [178].
22 *Quoine*, [185].
23 *Quoine*, [99].
24 *Quoine*, [109].
25 *BOM v BOK* [2019] 1 SLR 349.

unconscionable conduct, and instead promotes certainty and predictability for contracting parties'.[26]

Lord Mance drew a distinction between two forms of unconscionability: (1) unconscionability in bringing about the transaction; and (2) unconscionability in retaining the benefit of the transaction. According to Lord Mance, given that the present case required the modified approach, there was no role for the first type of unconscionability.[27] Rather, he focused on the second type of unconscionability, stating that it would be unconscionable for a trader to retain the benefit of transactions once he knew that they were the result of some major error.[28]

This distinction is reflected in the various points made in Lord Mance's dissent. First, he pointed out that the present situation was one where the primary vitiating factor relied on was mistake and in that context, unconscionability is a 'pre-requisite to equitable relief'.[29] Second, he took the view that there can never be constructive notice if one understands unconscionable behaviour 'based on knowledge by the non-mistaken party as behaviour conducing to the mistaken party remaining mistaken'.[30] Therefore, in cases where 'the primary basis for relief is a mistake of which the non-mistaken party has constructive notice', the main inquiry is whether there is unconscionable behaviour sufficient to invoke the court's equitable jurisdiction.[31]

Finally, while Lord Mance took the view that there was no constructive notice in the present case, he opined that in order for constructive notice to have its 'relevant role' in Singapore law,[32] unconscionability could not be merely limited to knowledge of the mistake – it must also encompass behaviour in 'seeking to retain the benefit of the mistake once it [was] discovered'.[33] This is because, according to Lord Mance, the underlying rationale behind the doctrine of unilateral mistake was not a lack of correspondence between offer and acceptance but a principle of justice.[34] However, given that constructive notice depended on human involvement in the transaction, and there was none in this case, the relevant inquiry should have been whether the Respondent had actual knowledge of the error had the transactions been foreseen or if there had been human involvement at the time, which would include knowledge of the error as soon as it was discovered.[35] Unconscionability was therefore only relevant in that it would be unconscionable for the Respondent to retain the benefit of the transactions once they came to know that it was the result of a major error.[36]

26 *Quoine*, [110].
27 *Quoine*, [204].
28 *Quoine*, [205].
29 *Quoine*, [204].
30 *Quoine*, [170].
31 *Ibid.*
32 *Quoine*, [173].
33 *Ibid.*
34 *Quoine*, [181].
35 *Quoine*, [204].
36 *Quoine*, [205].

Taken cumulatively, the above points suggest that Lord Mance conceptualised unconscionability, vis-à-vis the requirement of constructive notice, as the key inquiry where unilateral mistake at equity is concerned in cases, such as the present one, where constructive notice could not be shown.[37] Being an equitable doctrine, the goal was to ensure justice, and this demanded that the requirement of unconscionability also included the behaviour of the non-mistaken party after the mistake was discovered.

CONCLUSION

Quoine demonstrates that existing common law principles may be sufficiently flexible to tackle novel situations arising from the application of new technologies. But *Quoine* was a case where the software involved could not develop its own responses to varying conditions. Cases involving software that can adapt its own responses to varying conditions (i.e. Artificial Intelligence), may necessitate changes to the doctrine of unilateral mistake given that finding actual or constructive knowledge of the error may well be impossible in such a situation. In that regard, the doctrine of unilateral mistake at equity, as conceptualised by Lord Mance, may point us towards a viable answer.

37 See *Chwee Kin Keong* at [76]–[78] where the court took the view that constructive notice, vis-à-vis that of unconscionability, was the key inquiry where unilateral mistake at equity was concerned. This is because unconscionability could only be based on what the non-mistaken party knows.