From marketplace to cosmos : the emergence of a new model of balance and its impact on thought, 1250-1375

Autor(en): **Kaye, Joel**

Objekttyp: **Article**

Zeitschrift: **Traverse : Zeitschrift für Geschichte = Revue d'histoire**

Band (Jahr): **28 (2021)**

Heft 1: **Richesse : reflets des 5es Journées suisses d'histoire = Reichtum : Einblicke in die 5. Schweizerischen Geschichtstage**

PDF erstellt am: **26.05.2024**

Persistenter Link: https://doi.org/10.5169/seals-919506

From Marketplace to Cosmos

The Emergence of a New Model of Balance and its Impact on Thought, 1250–1375

Joel Kaye

My talk centers on the role that balance has played and continues to play in the history of ideas.[1]

We speak today of balanced performances, balanced tastes, balanced mental states, balances of power – the balance of nature itself. In all these cases, balance holds a valence so positive that it approaches an unquestioned ideal. The sense we have of its presence or absence in large measure determines our judgment of what is right or wrong, ordered or disordered, beneficial or dangerous. Its opposite, imbalance, almost invariably signals sickness and malfunction. When we stop to think about it, we can recognize the enormous breadth of meaning we attach to our sense of balance, but we might also recognize, with some surprise, just how little we actually *do* think about it.

The same was true for the Middle Ages. Despite the central place that the ideal of balance occupied in virtually every area of medieval thought, it was almost never questioned or problematized as a topic in itself. And this raises a question: Why did it, and why does it still, remain almost invisible as a subject of historical analysis? I will suggest two reasons. The first is that our recognition of balance's great importance to our psychological, intellectual, and social life tends to encourage a biological and hence essentialist understanding of it. Balance is balance: we all know what we mean by it; we all trust our sense of it; we never imagine that it is changing, or even that it *can* change. For this reason, it is difficult for us to think of it as developing within specific cultural contexts, or as changing in form over historical time.

The second reason, equally relevant, is that balance lies *beneath* the level of conscious awareness. It is tied to a generalized *sense* – a general *feeling* for how objects and spaces are or ought to be arranged – a wordless grasp of how things properly work together or fit together in the world, extending all the way down to our discomfort when we see a picture hanging unevenly on a wall.

For this reason, rather than serving as the subject of thought, balance has traditionally served as the unworded but pervasive *ground* of thought, exercising its great influence beneath the surface of conscious recognition. This does not, however, lessen its importance in any way. Rather (to repeat), the sense of its pres-

ence or absence underlies the most crucial of human judgments: what is productive or destructive, beautiful or ugly, healthy or sick. For the historian who has become aware of balance as an historical subject in itself, the first problem, then, is how to recognize the changes that have occurred to and within this un-worded sense over time; and the second is how to uncover the profound intellectual effects these changes have made possible.

My presentation comes out of my recent book: *A History of Balance, 1250–1375: The Emergence of a New Model of Equilibrium and Its Impact on Thought*.[2] In it, and in my talk, I hope to provide evidence for a series of claims: that the sense of what constitutes balance assumes different forms in different cultures at different times; that these forms of balance are composed of assumptions and intuitions that are linked together into a cohesive whole, and as such are open to being analyzed and modelled; that the ideal of attaining and maintaining balance lay at the core of intellectual disciplines over the whole of the medieval period; and that between approximately 1250 and 1350 a manifestly new sense and model of balance and its potentialities emerged within university culture – one that represented a momentous break with the intellectual past.

From this base, I will propose, first, that transformative developments in economic life over the twelfth and thirteenth centuries played an essential role in shaping the new model of balance and determining the constellation of elements that defined it. And second, that due to the utter centrality of balance as an intellectual ideal in this period, profound changes in its modeling had the effect of opening up striking new vistas of imaginative and speculative possibility.

The group of medieval thinkers whose speculations most clearly reflected the new model of balance occupied the very pinnacle of their intellectual culture – brilliant innovators whose ideas, viewed in retrospect, stand out today for their boldness and their forward-looking elements. But though the scholars who shared in the new model all wrote in the century between 1280 and 1380, I want to suggest, here at the beginning of my talk, that the strong links I discuss between rapid and substantial changes to the urban economic environment over this period, and the consequent emergence of a new model of balance within this intellectual culture, are applicable not just to the medieval past, but to most if not all of the many cultures and time periods represented by the Swiss historians here in this room today, right up to the present.

I speak of "models of balance" because even though the complex sense of balance remained unworded in the pre-modern period, it was far from unstructured. To the extent that this compound sense can be analyzed, disambiguated, and described, it is open to being modeled. As I've come to imagine and apply them, models of balance are composed of a cluster of interlocking assumptions, perceptions, and intuitions, characterized by a high degree of internal cohesion and

interior reflectivity. What I've found is that at any given period in history, they possess a degree of internal order and organization sufficient to allow them to be experienced as coherent *unities*, which, in turn, adds greatly to their potential to influence the thinking mind. Indeed, in the period I study, where the expectation and requirement of balance provided the ground of speculation in discipline after discipline, the cluster of linked elements that constituted the new model of balance exercised remarkable power – nothing short of the power to determine the possibilities – as well as the limits – of what could be imagined, envisioned, comprehended, and thought.

Having said this, I quickly add that while medieval Latin contained the word *bilancia*, it referred solely to the actions of the two-panned mechanical scale and did not express the complex *sense* of balance that is the subject of this talk. In order to come close to expressing this sense, pre-modern thinkers most often employed the word *aequalitas* – "equality" – a word that conveyed a range of meanings in pre-modern culture that it no longer does today, especially in its capacity to express the idea of proportionality. For example, they applied the word *aequalitas* to the complex proportional balance maintained within the multiple working parts of the human body; to the political ideal of civic balance, sought between multiple competing groups and interests in the *civitas*; to the proportional balance achieved between buyers and sellers in the marketplace; and even, as we will see, to the balanced order of earthly nature and of the cosmos itself.

Over the medieval centuries, the central importance of *balance/aequalitas* as an ideal within scholastic thought, remained unchanged. What changed within the culture of scholasticism between 1280 and 1380 was the way *aequalitas* was modeled – the range of possibilities and potentialities that were attached to the sense of what balance is and can be. And the change was profound.

Among an elite group of university scholars, the new modeling of balance encompassed – for the first time in the long medieval centuries – the idea that the created world was composed of a series of complex working systems, each capable of *ordering and equalizing itself*, in the absence of any overarching ordering and directing Intelligence, and merely through the dynamic interaction of its ever-shifting parts. From what I have been able to tell, this particular model of balance represents the earliest anticipation of our *modern* understanding of the word "equilibrium", and hence I refer to it in my book and in this talk as "the new model of equilibrium".

In the introduction to my book, I list more than two dozen constitutive elements of this "new model of equilibrium".[3] Here, and in the appendix, I offer what I think are ten of its most characteristic and impactful components:

1. Where formerly balance had been viewed as a pre-condition of existence, instilled into Creation by a creating God, or built into Nature in the Aristotelian

universe, now the focus shifted to the visualization and exploration of complex functioning systems in which *balance/aequalitas* was imagined as an *aggregate product*, resulting entirely from the interior interaction of multiple moving parts.

2. The very concept of fully systematic self-ordering and self-equalizing becomes thinkable.

3. Within the newly conceived self-equalizing system, values and natures formerly fixed in their place by Nature or by God were now assumed to be fluid and changeable, ever-shifting in relation to their shifting position and function within the systematic whole.

4. As this occurred, in what represented a huge intellectual break with the medieval past, relativity replaced hierarchy as the key to comprehending order and identity. The working system was reconceived as a *fluid relational field*, with no fixed top or bottom, beginning or end.

5. In the new imagination of the working system, expanding and contracting lines replaced points, and the concern with the details of motion and change replaced the search for essences and perfections.

6. As points were replaced by expanding and contracting lines, the underlying mathematics of equalization moved from addition to multiplication, and from arithmetic to a form of applied geometry.

7. Given the recognition of the system's ever-moving and ever-shifting parts, the goal of full knowledge was abandoned in favor of estimations and approximations. Indeed, those who shared in the new model often noted that estimation and approximation were now the *only* ways that entities undergoing continual change can be measured and known.

8. The inescapable indeterminism of the new relational model opened the door to reasoning in terms of probabilities.

9. In judging the systematic whole, good function became a primary value and consideration in itself. Indeed, as we will see, the mere recognition that a system functioned well, could *compel* the revaluation of traditional judgments and beliefs that the system either ignored or transgressed.

10. And my final element here: As fixed natures and hierarchies were replaced by ever-shifting relational fields, individual parts that were once greatly feared as being inescapably *un*equal or *im*balanced or *dis*ordered in their natures, were now open to being integrated into the larger equilibrium of the systematic whole.

What I hope to convey through this abridged listing, is just how complex and many-faceted models of balance are on close examination, and how utterly intertwined are their elements. I believe this is true not only for the new model of balance/equilibrium that emerged in this period, but for every model of balance, in every culture and period that they are found.

When a constellation of intellectual elements link to form a meaning-web of such complexity and reflectivity, its weight and potential impact is multiplied far beyond the sum of its parts. The model becomes more than a collection – it becomes, in medieval terms, a "unity" (*unitas*), which is to say, a coherent and cohesive whole. As such, it possesses a characteristic feel and a characteristic rhythm, which can be literally sensed, even if it remains beneath the level of consciousness – especially so (and this is important to stress) by the most perceptive thinkers within any intellectual culture. It is, I would argue, the *sensual presence* of models of balance that allows them their great weight and sway in the realm of thought. Over the period 1280 to 1380, those intellectuals who came to sense and then apply the new model of equilibrium to their speculations, could see things, imagine things, and speculate on things that those who had not could not.

In my search for the factors underlying the new model's emergence in this period, I found four to be of primary importance: the influence of authoritative texts, the influence of particular educational settings, the influence of major technological developments, and the lived experience of rapidly changing socio-economic environments. Today I only have time to discuss what I consider the most important of these in the period under consideration – the factor *sine qua non* – and that is the rapidly changing reality and perception of economic life in the cities of thirteenth century Europe.

Indeed, I have come to believe that the intellectual attempt to make sense of the complex processes of equalization taking place in the urban marketplace in this period, following a century of unprecedented economic expansion on many fronts, almost *required* the imagination of new forms of balance and equilibrium. The first writings I have found in which the new model of equilibrium appears nearly fully-formed, are late thirteenth-century scholastic attempts to comprehend the logic of commercial exchange in the urban marketplace. But again, rather than this being unique to this time period, I strongly suspect that in every culture and every historical period – including today – dominant forms of economic exchange shape the cultural modeling of balance on the deepest level.

Living as we do in the world of late capitalism, where profit – a species of *inequality* – is understood to be the root and goal of economic exchange, one might well wonder why balance and equilibrium would be so central to the understanding of economic exchange in the medieval period. This would only make sense if economic attitudes and ideals were very different back then: and indeed they were.

In virtually every philosophical, theological, and legal text on the subject written in the Middle Ages (and for centuries following), the *required* goal of *all* forms of economic exchange was defined as the establishment of an *equality* between exchangers, even as they recognized that mutual bargaining from self-interest

was one way of achieving this goal. Writers termed this required goal *aequalitas*, but the identification of this word with the ideal of balance is fully apparent in the metaphors they applied. In short, scholastic writers universally identified the process of economic exchange as a *process of balancing toward the goal of equalization*.

By this same logic, the production of a manifest inequality in exchange was associated with the sins of thievery and usury and explicitly condemned. This remained the case over the entire medieval period, despite huge advances, over the course of the twelfth and thirteenth centuries, in the areas of monetization, commercialization, urbanization, and market development – an advance so profound that modern historians now routinely use the term "Commercial Revolution of the Middle Ages" to refer to it.

The persistence of the usury prohibition in medieval economic thought is often taken as a sign that churchmen of the period were ignorant – even willfully ignorant – of the details of economic life in their society. The truth is far more interesting. The vehemence of the Church's condemnation of usury had the effect of *forcing* Christian theologians and legal scholars to become expert in the ways of the marketplace. Only in this way could they manage the enormous resources held by ecclesiastical institutions in an age of multiplying credit transactions and financial complexities; and only in this way could they hope to recognize usurious transactions and root them out.

Those clerics who undertook this task were gradually brought to recognize – and more often than not, to accept – that economic life functions according to its own rules and its own principles – principles that were often distinct from, and even at odds with, principles defining the Christian life. They came, for example, to recognize that economic truths are at best provisional and approximative, rather than absolute; that economic judgment revolves around unavoidable risks and probabilities rather than certainties; and (perhaps above all) that economic value is ever-shifting with respect to ever-changing contexts and ever-changing human needs, and as such, is *fully relativized*, rather than fixed and ordered to any hierarchy recognizable within God's plan.

Yet despite their recognition of the disparities between Christian values and market values, theologians and canon lawyers remained confident that they could carry their exalted ideal of *balance/aequalitas* into the marketplace as the essential test of licit exchange. As a totally unintended consequence, however, the ever-multiplying speed, volume, and complexity of commercial and market exchange over the twelfth and thirteenth centuries, had the historic effect of pressuring, stretching, and ultimately reshaping the modeling of *balance* itself.

One can see this clearly toward the end of the thirteenth century, at a time when it had become evident to virtually all observers that prices shift continually relative

to shifting contexts and needs; that all economic exchanges involve risks, doubts, and inescapable uncertainties; and consequently, that all economic values are unstable and in flux, including the value of money itself. Inescapable uncertainties, in turn, vitiated the possibility that a clear one-to-one equality between exchangers could ever be truly known or established. And yet, the traditional requirement for *aequalitas* remained wholly intact.

Faced with the continuing question of what might actually constitute *aequalitas* in exchange, Godfrey of Fontaines, writing in the 1270s, was one of a number of theologians coming to a fascinating conclusion. True, Godfrey admits, in most contracts of buying and selling, neither party can ever know, for certain, the value of the goods they are exchanging, nor which party might benefit more from the exchange in the long term. Doubt is inescapable. But Godfrey was suddenly able to imagine, and to argue, that the very condition of shared uncertainty, *in itself*, produced an *aequalitas* sufficient to render exchanges licit. The unshakeable requirement for *aequalitas* in exchange has been met, he argues, as long as there exists an *equal measure of doubt* between buyer and seller (*aequaliter est dubium ex parte vendentis et ementis*).[4]

When the requirement for equality in exchange can be satisfied by the equality of doubt it contains, and when a sufficient exchange equality is established by the willingness of all parties to assume a similar doubt at a similar price, we have achieved a new, protean, and potent understanding of *aequalitas*, and thus of balance itself – one that had been vastly expanded over the previous century.

Further expansion soon followed, as evidenced by a remarkable treatise on usury and contracts of sale authored in the early 1290s by the Franciscan theologian, Peter of John Olivi. Olivi's treatise *On Buying and Selling, On Usury, and On Restitution* (*Tractatus de emptionibus et venditionibus, de usuris, de restitutionibus*, also titled *De contractibus*) contains literally dozens of prescient economic insights – so many that his treatise remained unsurpassed in its economic analysis for more than two hundred years after its composition![5] But even more remarkable than his individual insights was his unification of them within an over-arching *ratio* or rationale – one that was sufficiently capacious, both to comprehend, and to theologically justify, some of the most dynamic economic realities of his day.[6]

Medieval writers employed many rationalizations to condemn usury and to insist that any violation of equality in the loan is tantamount to a violation of both the divine and the natural order. Of these rationalizations, the most common one held that money is inert and sterile by its nature, and, therefore, for money to grow by itself or to multiply itself represents a clear violation of the natural order. This understanding, first enunciated by Aristotle, was fully supported by the early Church Fathers and enshrined in church law. Indeed, Christian theologians and

lawyers continued to insist that if I lend you a specific sum of money, I can require only the exact sum I lent you in return. To demand the repayment of even a single penny more was defined as the sin of usury – the creation of an unequal excess where none was warranted – a clear violation of *aequalitas*. In reading Olivi, however, it soon becomes clear that he has arrived at a new understanding of the dynamic of monetized exchange in his society, and that at the core of this new understanding lay a reconceptualization of *balance/aequalitas* itself.

To illustrate this, I present only one of his exceptional economic insights – his definition of "capital" or what he calls *capitale*. In utter contrast to traditional claims for the sterility of all money, Olivi asserts that money, *when in the form of capitale*, is, in its natural essence, fruitful, expansive, and multiplying. When he first enunciates this principle, he writes: "money, which in the firm intent of its [merchant] owner is directed toward the production of *probable* profit, possesses … a kind of seminal cause of profit within itself (*quamdam seminalem rationem lucrosi*) that we commonly call *capitale*. And therefore it possesses not only its simple numerical value as money-measure, but in addition, a superadded value (*valor superadiunctus*)."[7]

In Olivi's understanding, capital is money that has "taken on" (*assumit*) its quality of fruitfulness and multiplication by absorbing into itself the industry and commercial know-how of the merchants who employ it. Merchants, he writes, not only presuppose that this superadded value "truly" exists within *capitale* as the "seed" of its fruitfulness (*quasi seminaliter*), but he recognizes that they are also skilled in *rationally estimating* the changing degree of this fruitfulness, expressible in the rise and fall of price along a continuum, as commercial outlooks change from day to day. Possessing such *probabilistic* knowledge concerning their possibilities for profit, they willingly buy and sell money for a fluctuating agreed upon price, when they believe the time is right. Furthermore, since Olivi has come to recognize that it is the very nature of capital to multiply, he judges that merchants do so without committing a sin against nature, and thus, without committing the sin of usury.[8] That is to say, since it is the very nature of capital to multiply, even when merchants buy and sell money at ever-changing values, they are fully satisfying the traditional requirement for *aequalitas* in exchange – *as Olivi has now come to define it*.

Olivi's new thinking in the area of merchant capital can be seen in numerous other economic areas as well, one of which is directly relevant to the theme of our meeting: his notably positive attitudes toward merchant profit and commercial wealth.

His position on mercantile wealth follows a gradual yet profound reevaluation of the role of merchants and their contributions to society, which proceeded over the course of the centuries-long "commercial revolution". In its early years, in the

late eleventh and early twelfth century, we find theologians and moralists classifying merchants as little better than thieves. Their commercial practice of buying goods at one price and selling them later at an elevated price, without having improved them in any observable way, was often viewed as the unnatural creation of something out of nothing – a clear case of *inaequalitas* – a determination that caused merchants to be frequently identified as agents of social, economic, and (in many sermons of the day) even cosmic imbalance.

Added to this, it soon became quite clear that commerce and speculation were capable of multiplying wealth in a way that traditional land ownership and land management could simply never keep up with. Text after text expresses anger and disgust that low-born parvenus were converting their liquid wealth into social status and rising rapidly in the urban hierarchy. It was in this atmosphere, that newly acquired wealth and money were commonly viewed as powerful forces of social, moral, and political corrosion, capable of dissolving and overturning all traditional values and hierarchies.

From the mid-twelfth through the mid-thirteenth century, we can see these attitudes slowly moderate. As the commercial revolution began to hit its stride, and as the benefits of commerce became ever clearer to observers, especially within the rapidly growing towns and cities of the period, the fear and anxiety concerning the "unnatural" multiplication of money and commercial wealth diminished considerably.

At the same time, we can see a new understanding emerging across urban Europe over the thirteenth century: while individual merchants might well be guilty of usury and excessive greed, and might well present threats to the social and political order, the perception grew that the presence and activity of merchants *as a group*, almost invariably contributed to the common wealth of the *civitas* – that with all their push for self-interested acquisition, and with all the potential social dangers they presented, nevertheless, where merchants were present, the city flourished.

When we jump ahead to Olivi at the end of the thirteenth century, we can see that he takes yet another major step toward integrating the merchant and merchant wealth into the natural order of civic life. He accomplished this, in large part, by explicitly recognizing their role in serving the *bonum commune* – the *Common Good* – which had become an ideal of immense importance over the course of the thirteenth century, and which, for Olivi, represented the highest and most perfect of all socio-political goods.[9]

As its name implies, the *bonum commune* represents a coherent aggregate whole – the sum of its moving, acting, and intersecting parts, which in this case are the citizens of the *civitas*, including the citizen-merchants who supply its tangible needs. Olivi argues that the function that merchants serve is as productive

and deserving of reward as the labor of the farmer or the artisan. In order to establish the right of merchants to charge for their services, he notes the expenses they incur in their initial investments, the considerable dangers they face and the risks they assume in their journeys, and the physical labor they perform in their act of transportation. But he then goes further than his contemporaries in arguing that merchants deserve still extra recompense for the notable mental and intellectual qualities they bring to their work. He cites their highly developed skills in estimating prices and values, their capacity to anticipate future conditions and to calculate probabilities, and even the long training that their challenging profession requires, all of which add to the value of their labor.[10]

Still, if Olivi is to legitimate the considerable commercial profits and wealth that merchants acquire, which was unavoidably apparent in the communes he himself inhabited, he must go one step further: He must explain why merchants can multiply their wealth as no other laborers can – why remuneration of commercial labor exists, and even *must* exist, in the super-added realm of *multiplication*, while in almost all other areas of labor, it rests in the realm of *addition*, tied to wages that are regular and relatively fixed. His explanation here is clear and direct. By recognizing that the primary role of the merchant is "to buy and transport great amounts of merchandise and precious goods", he can then argue that in the absence of such multiplication, merchants would simply be unable to accumulate the wealth necessary to fulfill their proper role in service to the Common Good.[11] In short, even though the accumulation of merchant profits and wealth might well appear excessive and out of balance to urban observers and to many Christian moralists, Olivi, the rigorist Franciscan theologian, can judge it positively, as both rational and beneficial, by viewing it in terms of its contribution to the larger *systematic order and balance of the Bonum Commune*.[12]

What I'd like to underline here is how closely Olivi's legitimization of merchant profit and wealth mirrors his legitimization of commercial *capitale* mentioned earlier. Both concepts are situated squarely in the realm of multiplication rather than addition; both assume and legitimate as natural the production of "super-added" value (*valor superadiunctus*); both are thus essentially open-ended and resist integration into traditional notions of balance. Yet rather than fearing or condemning the runaway potential attached to each of these characteristics – as virtually all thinkers of previous generations had – Olivi is able to rationalize and naturalize them. He can do this because he has grasped both their necessity within the dynamic system of economic exchange, and, equally so, their necessity within the order of the *Bonum commune*, the ultimate standard of systematic order in the *civitas*.

Olivi's revaluation of merchant *capitale* and merchant wealth represent only two examples out of many in the *Tractatus*, in which he stretches the bounds

of economic *balance/aequalitas* beyond anything imagined previously. Taken together, the principles he enunciates to rationalize his new sense of what this *aequalitas* can look like, articulate almost all the major elements constituting the "new model of equilibrium" that I outlined at the beginning of my talk, and which you can find summarized in the Appendix. Among these: the integration of multiplication into the mathematics of equalization; the full recognition that economic value is relative value, which is never a fixed and knowable point, but rather rises and falls continually, relative to ever-shifting contexts; the recognition that the determination of price is never fixed, but is necessarily tied to estimations, approximations, and probabilities; the recognition that probabilities – especially those involved in commercial profit – can be assigned rational if fluctuating values, expressible in monetary terms. And all of this is made possible by his having expanded the focus of his analysis of equalization: taking if from the traditional level of individual exchangers and individual merchants to the level of the systematic working whole – the Common Good of the community of exchangers.

The result was a clear vision of market exchange as a self-balancing system in dynamic equilibrium, in which the free interchange of individual exchangers – which is to say the *free interchange of unbalanced individual parts* – each desiring to buy cheap and sell dear – each desiring to profit – indeed, each desiring to gain *more* than the other – nevertheless produces, *somehow*, an overarching balance in the systematic whole of the urban marketplace.

The task facing Olivi and other scholastic authors at the end of the thirteenth century was to formulate new explanations for the way they witnessed things actually working in the urban marketplace – explanations which, at the same time, could be made consistent with the traditional requirement for the maintenance of *aequalitas* in exchange. The end result was a re-modeling of *aequalitas* itself, and hence of balance itself, in the direction of systematic equilibrium – a direction that had been literally unimaginable in earlier generations.

I turn now, in the short time that remains, to consider the consistently forward-looking ways of seeing and comprehending the world that the intuition of the new model of equilibrium made possible. In my book I detail dozens of speculations of this kind, drawn from the areas of scholastic political theory, medical theory, and natural philosophy. But in the time that remains, I must limit myself to a single fertile example: a speculation taken from scholastic natural philosophy in the area we today would recognize as "geology".

The author of this wide-ranging geological speculation is Jean Buridan, an honored master in the school of the arts at the university of Paris from the 1330's through the 1350's, and a philosopher extraordinaire. In my view, Buridan's writ-

 ings in many areas of what we would today call "science" reveal what had be-

come newly possible to think, to envision, and to imagine by the first half of the fourteenth century, as a result of the new modeling of balance in the direction of equilibrium.

At the beginning of Buridan's Commentary to Book 2 of Aristotle's treatise *On the Heavens*, and in response to a seemingly minor observation of Aristotle's, Buridan raises a question with large implications: "Whether the whole of the earth is habitable (*Utrum tota terra sit habitabilis*)?"[13] He acknowledges from his opening sentence that three-quarters of the earth's surface lies below water, while only ¼ lies above and is habitable in human terms. He then raises a question Aristotle had never considered: whether it is the *same* ¼ of the earth that has always been and will always remain both dry and habitable above the waters. To the extent that there was a traditional Christian or Aristotelian position on the question, it held that the portion of habitable earth had remained roughly the same since creation, planned that way by a benevolent God, or by benevolent Nature, to serve the benefit of humankind.

But Buridan is not satisfied with this. Although he is both a devout Christian and a deeply committed Aristotelian (as are nearly all the major university scholars and thinkers in his day), he looks for his answer not in God's *fiat* nor in Aristotelian notions of final cause, which he explicitly rejects in this discussion, but rather entirely towards physics and physical necessity. He reasons that given the spherical nature of the earth, and given that according to Aristotelian physics all earth falls naturally to the earth's center, and given the great over-abundance of water with respect to land, and finally, assuming along with Aristotle – as Buridan *clearly* does here – that the universe is eternal (*si mundus fuerit perpetuus, ut ponit Aristoteles*), he is led to ask why, in the fullness of time, should *any* portion of land remain above the water and habitable?[14]

One possibility he raises, is that the earth's highly uneven surface renders its mountainous heights insurmountable by water. But after raising this possibility he quickly dismisses it, and he does so on the basis of what he has observed with his own eyes: the process that we today call "erosion". All streams, he writes, continually carry bits of earth ever downward to the sea – and this, he notes, takes place perpetually, even at the summits of the highest mountains. "Thus," he writes, "through an infinite time (*ab infinito tempore*) these mountains ought to be wholly consumed, and the earth reduced to lying entirely beneath the waters."[15]

There are a number of startling assumptions here. To begin with, Buridan's eternal world is about as far as you can get from the biblical world of 6,000 years or so that medieval people are generally supposed to have believed in implicitly. Clearly, the infinite extension of Buridan's time frame, which he shared with a number of his fellow Aristotelians in this period, makes possible a considerably

deeper exploration of the logic of natural systems. At the same time, it most certainly heightens the attention that must be paid to the logic of systematic equilibrium.

Thinking in Aristotelian time rather than Christian time, Buridan projects that if erosion continues over eternity, even the highest mountain will eventually be washed into the sea. But more striking still, he reasons that if the world really *is* eternal, as Aristotle asserts, then all the earth that was once above the waters has *already* been washed into the sea. Given this conclusion, he is faced first with the problem of explaining the continued existence of *any* dry land whatsoever into the present, and then the task of imagining the physical processes at work that might explain this continuation.

And then he goes still further. Given that erosion is an eternal process, and given that every portion of dry land will eventually be taken into the sea, he tries to imagine a physical system that can explain not only why *some* dry land will be continually preserved, but why the same *exact proportion* of dry land will remain *eternally constant* at one quarter above the sea to three quarters below, as he postulates that it has over the endless eons.

To answer this question, indeed to even *ask* this question, Buridan imagines the whole of earthly nature as a physical system in what we today would call "dynamic equilibrium". He invents an elaborate physical explanation, which, as he writes: "seems probable to me and by means of which all appearances could be perpetually saved."[16] He views the totality of geological displacement over eternity as a grand, integrated, and *self-balancing system*, functioning entirely on physical principles. Heat and cold cause evaporation and condensation, which in turn differentially rarify and condense earth and water, resulting in a continual interchange between *relatively* light particles of earth coming to the surface of the water, while relatively heavy particles descend to the depths.

As a consequence, he speculates that while parts of earth are being continually washed into the sea at multiple parts of the globe, an identical quantity of earth is being raised above the circle of the waters at other parts, eventually accumulating there to produce the very same mountainous heights that are being worn down elsewhere. Indeed, he explains the very existence of mountainous heights through this infinite process of gradual accumulation in eternal equilibrium.

We can easily superimpose the form of the mechanical balance on Buridan's model here: as one mountain slowly disintegrates and falls, due to erosion, another slowly accumulates and rises somewhere else on the globe, in perfectly balanced measure.

Buridan, however, envisions not one active balance, but a near-infinity of them, covering the whole of the shifting earth over all eternity. His model of activity is purely relational, governed by geometrical and physical necessity, and driven

by its own internal logic. It begins with recognizable elements from Aristotelian physics, but there is something deeper within it that pulls and pushes the pieces into a new formal arrangement, allowing him to reimagine the "what is" of nature at any moment as an *aggregate product of systematic activity in equilibrium* rather than the result of a pre-existing or purposeful plan. The deeper element underlying these profound changes is not a concrete, expressible *idea* of balance (which Buridan neither mentions, nor appears to recognize), but, rather, as I have argued, a charged new *sense* of the potentialities of balance; a sense that is active *beneath* the level of his conscious recognition, and yet is capable of literally remodeling how the world might work and find order.

To conclude: In the sections on Olivi and Buridan that I presented, I tried to summarize and condense extensive speculations into only a few pages and minutes of talk. I invite those who might desire a more detailed and fuller analysis of these exemplars of the new model of equilibrium to consult the richer story I provide in *A History of Balance*. There they will also find many additional examples taken from medieval economic thought, scientific thought, medical theory, and political thought. Still, I hope I have managed to convey the striking conceptual and perceptual novelties that underlay Buridan's geological writings. Here we can see the great Aristotelian commentator seeing the world and its workings through new eyes, and thinking in ways that had been previously unthinkable. Also previously unthinkable was Olivi's reenvisioning of commercial capital as *naturally and in its essence*, fertile, fruitful, and expansive; and equally so, his enthusiastic recognition that multiplying commercial profit and wealth was essential to both merchant activity and to the maintenance of the Common Good. Indeed, I have found that every leading thinker of the fourteenth century, who shared in the intuition of the new model of equilibrium, was able to produce vital speculations that redefined as *natural* what had previously been feared and attacked as profoundly *unnatural*.

But how *does* the unnatural become naturalized within an intellectual culture? How *does* the unthinkable become thinkable – the unimaginable imaginable? What is it that causes vital new questions to rise to the surface and potent new answers to be envisaged and proposed? And how can we explain the periodic emergence within intellectual cultures of strikingly new ways of picturing how the world works and finds order? My aim today has been to suggest that a focus on the history of balance, and a close analysis of the constellation of elements that constitute new models of balance as they periodically replace older models, can shed light on each of these questions. And my hunch is that this is true not only for medieval intellectual culture, but for other cultures and other time periods as well, right up to the present.

Appendix

The following is an abridged list of the major elements that composed the "new model of equilibrium", excerpted from *A History of Balance, 1250–1350: The Emergence of a New Model of Equilibrium and its Impact on Thought* (Cambridge UP, 2014), 6–11. See also, *L'histoire de l'équilibre, 1250–1375. L'apparition d'un nouveau modèle d'équilibre et son impact sur la pensée* (Paris, Les Belles Lettres, 2017), 18–24.

1. The premonition of equilibrium: Where formerly balance had been viewed as a pre-condition of existence, instilled into Creation by a creating God, or built into Nature in the Aristotelian universe, in the new model of equilibrium the focus shifted to the visualization and exploration of complex functioning systems in which balance/*aequalitas* was imagined as an aggregate product that resulted from the systematic interaction of multiple moving parts.
2. As the process of systematic self-ordering and self-equalizing became thinkable, the dynamic interplay of interior parts within the working whole (e.g., the physical body, the body politic, the Common Good, the marketplace, even Nature itself) was imagined as sufficient in itself for achieving and maintaining balance.
3. The working system was reconceived as a relational field, possessing no fixed top, bottom, or center. Values and natures formerly fixed in their place by nature or by God were now assumed to be fluid and changeable, ever-shifting in relation to their ever-shifting position and function within the systematic whole.
4. Within the working system, relativity replaced hierarchy as the basis of order and identity. Relativistic thinking came to permeate the understanding of the structure and working principles of all systematic activity, including that of nature and the cosmos itself.
5. The image of the world was transformed from one composed of discrete points and perfections into one composed of ever-expanding, contracting, and intersecting lines – what I call "a world of lines". As points were replaced by lines, fixity gave way to fluidity, and concern with the details of motion and change replaced the search for essences and perfections.
6. Within the "world of lines", the underlying mathematics of balance/*aequalitas* shifted from arithmetic to geometry; from addition and subtraction to multiplication; and, in certain speculations, from the realm of integers into the realm of exponential powers
7. With respect to the system's moving parts, the goal of full knowledge was abandoned in favor of estimations and approximations. Indeed, those who shared in the new model often noted that estimation and approximation were

the only ways that humans can know and measure entities undergoing constant change.

8. The inescapable indeterminism of the new relational model opened the door to reasoning in terms of probabilities. No true mathematics of probability developed in this period, but what did develop was the understanding that probabilities represent a real (if discounted) "appreciable value" (*valor appreciabilis*) that can be estimated and employed in the process of analysis.

9. Within the working system, good function became a primary value in itself. The capacity of the system merely to work and work well (which is to say, to maintain itself in balance/*aequalitas*) was now taken *in itself* as a sign of its positive value. Indeed, as we will see today, the mere recognition that a system functioned well could *compel* the revaluation of traditional beliefs that the system either ignored or transgressed

10. Examples of the model's transformative effects: Imbalance could now be transformed into balance simply through the natural play of objects, functions, and forces that comprise the functioning whole. Entities which had formerly been shunned as destabilizing and inimical to the process of equalization, such as doubt, risk, indeterminance, the unbounded, the infinite, the mathematically "irrational" and incommensurable, even willed inequalities, were now – within the new model of equilibrium – open to being integrated into the process of producing and maintaining systematic balance/*aequalitas*.

Please note the complexity, reflectivity, and interior logic that characterize the constellation of elements comprising the new model of equilibrium. My strong suspicion is that analysis will show similar complexities and reflectivities in every model of balance, regardless of culture or time period.

Notes

1 Keynote speech, delivered at the Swiss Congress of Historical Sciences, Zurich, June 6 2019.

2 Joel Kaye, *A History of Balance, 1250–1375. The Emergence of a New Model of Equilibrium and Its Impact on Thought*, Cambridge, New York 2014; Joel Kaye, *L'histoire de l'équilibre, 1250–1375. L'apparition d'un nouveau modèle d'équilibre et son impact sur la pensée*, préface d'Alain Boureau, trans. Christophe Jacquet, Paris 2017.

3 *A History of Balance* (see note 1), 6–11; *L'histoire de l'équilibre* (see note 1), 18–23.

4 Godfrey of Fontaines, "Quodlibet 5", in *Les philosphes belges*, Maurice De Wulf and Jean Hoffmans (ed.), Louvain 1914, 3, 63: "Contrarium arguitur per contrarium, quia ille contractus videtur licitus in quo constituitur aequalitas inter ementem et vendentem. Sed ita contingit in proposito: nam *aequaliter est dubium ex parte vendentis et ementis* de plus vel minus recipiendo; ergo et cetera" [my emphasis]. Godfrey's contemporary, the Franciscan Matthew of Acquasparta, offers a similar judgment, also in response to the question of the liceity of contracts *redditus ad vitam*. His opinion, taken from Quodlibet I, 9, is cited in Fabiano Veraja, *Le*

origini della controversia teologica sul contratto di censo nel XIII secolo, Rome 1960, 201–202: "Quidam enim simpliciter dicunt contractum esse iustum et licitum: quoniam, quamvis ibi sit inequalitas aliqua, tamen illa incerta est. *Unde propter eventus incertitudinem ista inequalitas habet quamdam equalitatem* [...] et ideo incertitudo eventus mortis facit in isto contractu quamdam equalitatem" [my emphasis]. Matthew will insist, however, that the two parties should at least aim to equalize the contract. For more on this subject, see *A History of Balance* (see note 1), 104–106; *L'histoire de l'équilibre* (see note 1), 104–106.

5 The following quotations from Olivi's Treatise are taken from the edition by Giacomo Todeschini, *Un trattato di economia politica francescano: il "De emptionibus et venditionibus, de usuris, de restitutionibus" di Pietro di Giovanni Olivi*, Rome 1980. The English translations from the Latin of this work (hereafter *Tractatus*) are mine.

6 What might appear even more remarkable to the modern reader is that Olivi was a Franciscan Friar and, moreover, a leader of the rigorist party within the Order, sworn to perfect poverty in emulation of his holy model, Saint Francis of Assisi. For a detailed discussion of Olivi and his economic writings, with accompanying bibliography, see *A History of Balance* (see note 1), 56–75, 106–127; *L'histoire de l'équilibre* (see note 1), 64–79, 106–125.

7 Olivi, *Tractatus* (see note 4), 85: "Causa autem quare sub tali pretio potest illud vendere vel commutare est [...] quia illud quod in firmo proposito domini sui est ordinatum ad aliquod probabile lucrum non solum habet rationem simplicis pecunie seu rei, sed ultra hoc quamdam seminalem rationem lucrosi quam communiter capitale vocamus, et ideo non solum habet reddi simpliciter valor ipsius sed etiam valor superadiunctus." For an appreciation of Olivi's precocity in utilizing the concept of probability and recognizing its profound implications, see James Franklin, The *Science of Conjecture. Evidence and Probability Before Pascal*, Baltimore 2001, 265.

8 Olivi, *Tractatus* (see note 4), 110: "Ergo praedictum interesse probabilis lucri, quodam modo causaliter, et quasi seminaliter continebatur in praedicto capitali: alias enim non posset licite exigi. [...] prout causaliter continentur in capitali, in quantum est capitale, idest in quantum vere et non ficte est in mercationes fiendas deputatum et destinatum; ergo hic non est peccatum usurae."

9 Olivi, *Tractatus* (see note 4), 51–56; *A History of Balance* (see note 1), 58–61, 107–113, 244–266; *L'histoire de l'équilibre* (see note 1), 65–68; 107–111; 220–239.

10 Olivi, *Tractatus* (see note 4), 63; *A History of Balance* (see note 1), 118–23; *L'histoire de l'équilibre* (see note 1), 111–116.

11 Olivi, *Tractatus* (see note 4), 63: "Si etiam non essent pecuniosi non possent grandes et caras merces prout terris expedit providere."

12 Olivi, *Tractatus* (see note 4), 63: "ex eo quod salvo eorum rationabili lucro."

13 *Joannis Buridani Expositio et Quaestiones in Aristotelis De caelo*, Benoît Patar (ed.), Louvain, 1996, Book II, q. 7, 410–17. For a detailed treatment of this question, see *A History of Balance* (see note 1), 442–456; *L'histoire de l'équilibre* (see note 1), 442–455; and Joel Kaye, "The (Re)Balance of Nature, 1250–1350," in Barbara Hanawalt and Lisa Kiser (eds.), *Engaging with Nature. Essays on the Natural World in Medieval and Early Modern Europe*, Notre Dame, Ind. 2008, 85–113. This question has been partially translated by Edward Grant in his *A Source Book in Medieval Science*, Cambridge, Mass. 1974, 621–624.

14 *Quaest. De caelo*, II, 7 (see note 12), 410. Also directly relevant to Buridan's novel geological speculations here (but not considered in this talk) are *Quaest. De caelo*, II, 22 (see note 12), 500–508, and Buridan's commentary to Aristotle's *Meteorologica,* in *Les Questiones super tres libros Metheorum Aristotelis de Jean Buridan: étude suivi de l'édition du livre 1*, Sylvie Bages (ed.), Paris 1986, esp. Book I, qq. 20 and 21, 288–316.

15 *Quaest. De caelo,* II, 7 (see note 12), 410: "Ideo videtur quod ab infinito tempore tota profunditas maris deberet esse replete terra, et haec elevatio terrae deberet esse consumpta [...]." While Buridan's speculation here is original in important respects, Aristotle's brilliant observations of the building up of the Nile Delta in Book I of the *Meteorologica*, and his deductions

concerning the mutual replacement of water and dry land over time, gave rise to a series of speculations in this area that preceded those of Buridan. On this, see Pierre Duhem, *Le système du monde*, vol. 9, Paris 1958, 79–323.

16 *Quaest. De caelo*, II, 7 (see note 12), 416.

Résumé

De la place du marché au cosmos. L'émergence d'une nouvelle conception de l'équilibre et son impact sur l'histoire des idées, 1250–1375

Ma présentation est centrée sur les manières changeantes par lesquelles l'équilibre a été conçu au cours du temps historique et sur l'impact profond que ces modèles variables ont produit dans le monde des idées. Au cours de la période de l'histoire européenne sur laquelle je me concentre, et encore aujourd'hui la plupart du temps, le sentiment de la présence ou de l'absence de l'équilibre sert de base aux jugements humains les plus cruciaux: l'évaluation de ce qui est ordonné ou désordonné, beau ou laid, productif ou destructeur, sain ou malade. Alors que nous pouvons tous reconnaître l'ampleur des significations liées à l'idéal d'équilibre, nous concevons rarement que cet idéal – ou le sentiment intérieure implicite qui lui sert de base – est susceptible d'encourir des changements majeurs à l'intérieur de contextes historiques spécifiques. J'espère au contraire apporter des preuves à une série d'affirmations: 1) l'équilibre a une histoire; 2) entre approximativement 1250 et 1350, un sens manifestement nouveau de l'équilibre et de ses potentialités a émergé au sein de la spéculation universitaire; 3) ce sens nouveau a trouvé une organisation et une forme dans un nouveau modèle de l'équilibre (anglais: *balance*), le premier modèle médiéval à anticiper le concept moderne d'équilibre (anglais: *equilibrium*); 4) à la racine de ce modèle se trouvent des développements considérables dans la vie et la pensée économique médiévale, qui incluent une transformation des attitudes scolastiques envers le profit commercial et la richesse marchande; et, finalement, 5) à cause de la centralité absolue de l'équilibre comme idéal dans la spéculation scolastique, des changements profonds dans sa conception à cette période ont eu pour effet d'ouvrir des horizons totalement nouveaux, en matière de possibilités imaginatives et spéculatives. C'est en particulier le cas dans le domaine que nous appelons aujourd'hui «la science», rendant possible une profonde reconceptualisation du monde et de son fonctionnement.

(Traduction: K. Crousaz)

Zusammenfassung

Vom Marktplatz zum Kosmos. Entstehung und Wirkung einer neuen Idee des Gleichgewichts, 1250–1375

Mein Vortrag historisiert «Gleichgewicht» in ideengeschichtlicher Perspektive. In der Epoche der europäischen Geschichte, auf die ich fokussiere, und grösstenteils auch heute noch bildet das Gefühl der An- oder Abwesenheit von Gleichgewicht die Basis der wichtigsten menschlichen Wertung: der Beurteilung dessen, was geordnet oder ungeordnet, schön oder hässlich, produktiv oder destruktiv, gesund oder krank ist. Zwar können wir alle die Bandbreite der Bedeutung erkennen, die mit dem Ideal des Gleichgewichts verbunden ist, wir können uns jedoch kaum vorstellen, dass dieses Ideal – oder das unausgesprochene Gefühl, das ihm zugrunde liegt – in bestimmten historischen Kontexten stark veränderlich ist. Ich hoffe, dagegen eine ganze Reihe von Argumenten liefern zu können: 1. Gleichgewicht hat eine Geschichte. 2. Zwischen etwa 1250 und 1350 entwickelte sich an den Universitäten ein neuer Sinn für Gleichgewicht und seine Möglichkeiten. Die komplexen Wahrnehmungen fanden 3. in einem neuen Modell von Gleichgewicht (*balance*) ihre Struktur und Form – dem ersten mittelalterlichen Modell, das das moderne Konzept des Ausgleichs (*equilibrium*) vorwegnahm. Dem Modell zugrunde lagen 4. bedeutsame Entwicklungen in der ökonomischen Theorie und Praxis, einschliesslich eines Wandels der scholastischen Einstellungen zu Profit und Reichtum. Da schliesslich 5. das Gleichgewichtsideal zentral für die scholastischen Spekulationen war, hatten tiefgreifende Veränderungen in dessen Modellierung den Effekt, dass sich insbesondere im Bereich der «Wissenschaft» neue imaginative und spekulative Möglichkeiten eröffneten. Das ermöglichte wiederum eine tiefgreifende Neukonzeption der Welt und ihrer Funktionsweise.

(Übersetzung: A. Rathmann-Lutz)