

SCALE, PRAYER AND PLAY

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MICRO-SCALE

How many angels can stand on the point of a needle? That playful, proverbial question was often posed among scholastics and students from the fourteenth century onwards when discussing the materiality of angels. It is first found in a German treatise of around 1320 by the female mystic known as Swester Katrei, or Sister Catherine, that enjoyed a certain popularity in the fourteenth and fifteenth centuries.¹ But leaving aside the teasing absurdity of the question, which is still current today,² it implicitly gives us an idea of the medieval understanding of scale and measure. Just as the cosmos stands for the inconceivably large and infinite, so does the point of a needle for the extremely small. It helps us, in these days of nanotechnology and astrophysics, to comprehend something of the amazement at micro-carving felt by a medieval public of owners, users and admirers. For in addition to the virtuoso method of manufacture, the minute scale of the scenes in the prayer nuts and other miniature devotional objects are a constant source of astonishment and awe.

The fascination with the extremely small was (and is) bound up with its intangibility and immeasurability.³ The smallest unit of measurement until the introduction of the metric system was the point, equivalent to 0.2 millimeters, which is actually the same as the point of a needle or pin, followed in size by the line (2 millimeters). Both stem from the world of typography

and book printing, which spread like wildfire in the early sixteenth century. However, neither was used very much in everyday life, because there was barely any need for them.⁴ Comparison was usually sufficient for measuring really small objects. When Antoni van Leeuwenhoek (1632–1723) began the first microscopic examinations around 1670 he described very small things as a tenth of the thickness of a hair.⁵ Such comparisons may not have been very accurate or scientific but they were fine for everyday needs because they were related to familiar or imaginable dimensions. One such natural unit of measure for something very small could be a hair or grain of corn, but a nut or fruit stone was often used too. An associated concept is ‘in a nutshell’ to indicate *multum in parvo*, a multitude in something small.⁶ It may have originated from a report by Cicero and Pliny about a handwritten *Iliad* that fitted into a nutshell.⁷

Reduction and magnification, like shortening (*brevitas*) and lengthening (*amplificatio*) are in inverse proportion to each other: without the one, not the other.⁸ As soon as something is made smaller its setting is enlarged. The disproportionate size of a saint stresses his greatness and at the same time the insignificance of an ordinary human being.⁹ Conversely, the reduction of his surroundings turns a human being into a giant, like Hercules among the Pygmies in a well-known description from the *Eikones* by Philostratus [FIG. 79].¹⁰ This essential feature of reduction, certainly to the micro-scale, is what makes it so attractive, as Lévi-Strauss noted.¹¹ For its absolute sense of scale

the extremely small assumes an anthropocentric universe.¹² The small object makes mankind the all-powerful center of its universe. At the same time, reduction is a typically human operation, for there is no reduced reality in nature, just a small reality, as Stewart remarked.¹³ That makes reversals of scale – *minificentia* and *magnificentia*, reduction and magnification – a recurrent theme in products of the human mind, literature and the visual arts, as illustrated by the late medieval micro-sculptures.

THE SPIRITUAL VIEW

A very common style figure used in the Middle Ages alongside *diminutio* and *meiosis*, for example, rhetorical tropes that are mainly intended to be ironic and belittling,¹⁴ was the so-called *Turmblick* (tower view) or *kataskopos*, a panoramic bird's-eye view that creates distance from its immediate surroundings (or even from the earth as a whole), making them so small that they fit into the field of vision of a human being. This effect was beautifully depicted around 1500 by Albrecht Dürer in his engraving *Nemesis*, with a highly detailed view from the clouds of the village of Klausen in the Eisack Valley [FIG. 80]. The German term *Turmblick* comes from a poem by 'Meistersinger' Hans Sachs (1494–1576),¹⁵ but ultimately this form of panoramic view derives from Scipio's all-encompassing, cosmic prospect from the Milky Way in Macrobius's *Commentary on the Dream of Scipio*.¹⁶ Dreams, visions, thought experiments and works of art like micro-carvings did indeed offer medieval man moments in which such reversals of



FIG. 80



scale could briefly become 'reality' and could lead to deeper insights and expand the mind.

Katascopy was therefore regarded as the paradigm for the relationship between vastness and wisdom.¹⁷ The way in which Abbot Suger (c. 1081–1151), in a much-quoted passage, describes his experience when he was led to meditate by looking at an altar cross decorated with gemstones of many colors and imagined himself to be in higher spheres is illustrative of the connection between katascopy and meditation, materiality and spirituality. 'Wherefore when sometimes from my delight in the ornament of God's house the multicolored appearance of the gems may call me away from ordinary concerns and indeed honest meditation by transferring from material things to immaterial ones may persuade [me] to focus on the diversity of the virtues of the saints, I seem to see myself to linger as though on some distant shore of the globe which may neither entirely be in the slime of the earth nor entirely in the purity of heaven and then by anagogical practice be able to be translated God willing from his lower to that higher [world].'¹⁸ More than two centuries later the female English mystic Julian had a similar visionary experience when she saw God's entire creation in a small hazelnut she was holding in her hand.¹⁹ The prayer nuts and other micro-sculptures, which are little bigger than a hazelnut, recreate something of the effect of this vision, namely that the proportions of scale between the viewer and the minuscule scene in his or her hand are reversed. A three-dimensional Crucifixion is seen as if the viewer is at a great height, and in need

of an optical aid like spectacles or a magnifying glass to make out and comprehend the details.²⁰ It is no accident that some micro-sculptures contain minute figures wearing glasses [FIG. 81].²¹

In fact, the connection between spectacles, devotion and 'spiritual sight' was not uncommon in the fifteenth and sixteenth centuries. Whereas glasses, a recent invention, were very rarely depicted in art in the fourteenth century, in the centuries that followed they were a regular attribute of people in prayer, along with the prayer book.²² Moreover, the polished 'reading stone' (beryl, which is the etymological root of the Dutch *bril* and German *Brille*, meaning eyeglasses),²³ could take on the symbolic meaning of an instrument with which the 'spiritual eye' could see clearly. That is well illustrated by Cusanus's (Nicholas of Cusa, 1401–1464) treatise of 1458 titled *De beryllo*, which is about spiritual sight. In his introduction Cusanus justifies the choice of title as follows. 'Beryl stones are bright, white and transparent. To them are given both concave and convex forms. And someone who looks out through them apprehends that which previously was invisible. If an intellectual beryl that had both a maximum and a minimum form were fitted in our intellectual eyes, then through the intermediateness of this beryl the indivisible Beginning of all things would be attained.'²⁴ In that respect, the need for an optical aid to 'read' a prayer nut takes on an added, symbolic dimension, one that brings 'true sight', the divine mystery, closer by making all sorts of illegible details visible.



FIG. 81



FIG. 82

That way of looking, through a lens, concentrates the gaze and heightens attention to details, and that is reflected in the way in which the maker of the micro-scenes indulged his *horror vacui* and left no space unused in order to add the smallest details to the scenes, many of them significant.²⁵ It is very likely that he, too, needed an optical aid to execute his *multum in parvo* to the accuracy of a millimeter, unless he was very short-sighted indeed.²⁶ There are a few mentions in the inventory of the Munich *Kunstammer* of an 'Augenglas' in the section devoted to miniature objects, and the original spectacles of the seventeenth-century Italian micro-carver Ottaviano Jannella (1635–1661) are preserved in his miniature workshop [FIG. 82].²⁷

The manufacture and consumption of these devotional micro-carvings are each other's counterparts. Sennett's characterization of concentrated carving as 'being as a thing' also applies here, in a sense, to the medieval users of a prayer nut.²⁸ The micro-scale of the scenes forced them to immerse themselves intensely in the scenes and all the details of Christ's life and suffering, and to lose themselves completely in them as if in a dream, seemingly beyond scale and time.²⁹ An 'experience of interiority', as Stewart characterized the small, the miniature.³⁰ One consequence of miniaturization, according to her, is letting go of the narrative and concentrating on contextual information, with the result that an awareness of 'temporal closure' makes way for 'spatial closure'.³¹ In other words, the space, minuscule in the case of prayer nuts, dictates the experience, not any sense

of time.³² Psychological experiments have demonstrated that there is indeed a direct connection between the scale of space that is experienced on the one hand and the observation of time: 'the experience of temporal duration is compressed relative to the clock in the same proportion as scale-model environments being observed are compressed relative to the full-sized environment'.³³ Or to put it another way: thirty minutes of measured time is experienced as five minutes if a person concentrates on a space with a scale of 1:6.

When applied to prayer nuts and other miniature devotional objects this implies that concentrated users become detached from surrounding reality and easily sink into a state of *dorveille*, or meditation in which real time is compressed to the scale of the micro-carving. After an hour of meditation the user will have the pleasant sense of having experienced only a fraction of that time.³⁴ In the early sixteenth century, when the days and the hours of the day were often centered around important biblical events, the Passion and other moments from Christian salvation history and their associated devotions, the effect of this would only have been stronger and would have contributed to a vivid experience of proximity to the divine.³⁵

For that matter, a comparable effect of hyper-concentration coupled with a lost awareness of size and time is also found in descriptions of miniaturized objects. That often results in extremely detailed and verbose descriptions of very small things, the neglect or absence of a narrative and the almost endless



FIGS. 83, 85

outpouring of contextual information.³⁶ Losing oneself completely in details in that way, which are consequently enlarged again, as it were, is superbly illustrated by Joost van Cranevelt's twenty-page description in 1633 of a single prayer nut, or the *Description of an Ancient Carved Box* that John Penniman wrote in 1820, but there are also impressive examples of such verbosity from the Middle Ages.³⁷

SPIRITUAL PLAY

A small boxwood 'monstrance' made for Emperor Charles V and its slightly smaller variant that belonged to Duke Albrecht V of Bavaria are unique objects assembled from loose segments that can be opened or even taken apart [FIGS. 18, 40, 83, 146]. This opening (and closing) is a symbolic action that is common to all boxwood devotional pieces. In the Middle Ages it was associated, among other things, with the revelation and internalization of divine secrets of salvation or with the bodies of Christ and the Virgin.³⁸ In addition, the closed object excited *curiositas* and encouraged playful actions – opening and literally discovering – that could ultimately lead to reflection and meditation.³⁹ Each segment of the 'monstrance' has ornate decorative and figurative carving which can itself give rise to meditation, but at the same time invites the viewer to embark on a playful, miniaturized quest, step by step, along the course of Christ's Passion.⁴⁰ The object as a whole acts as a series of miniature Stations of the Cross of the kind that took place with prayers in real, full-sized life in a church, or as depicted in Memling's Passion panel in Turin.⁴¹

The spectacle begins when the miniature pelican that forms the finial of this imperial object is unscrewed.⁴² A small, concealed brass screw can then be turned to set a gear mechanism in motion that folds the topmost part of the object back like a Gothic lily with four petals – a symbol of Mary’s virginity [FIG. 84]. On the inside of each petal is a miniature relief of an event in her life: the Annunciation, Nativity, Adoration of the Magi and Presentation in the Temple, all ensconced on an undulating petal [FIG. 85]. At the same time, as the lily is opening, a small figure of the Virgin with Jesus in her arms rises up in the center like the pistil of a flower surrounded by spiny stamens. The lily knob can then be screwed off the spherical central section and viewed as a separate object. The same applies to the foot and the central section, which is actually a *de luxe* prayer nut that has been integrated in the object. There are three free-standing scenes on three sides of the tapered hollow foot, which rests on six amusing little lions that appear to be collapsing under the load [FIG. 86]. One is the Entry into Jerusalem, in which the user is drawn into the story (and the object’s foot) through a gateway, along with Christ as it were [FIG. 87]. This is an invitation to screw the foot loose and see what is inside. Here one discovers three new scenes that would normally only be glimpsed vaguely through the open-work tracery of the foot: the Purging of the Temple, Christ Washing the Feet of the Disciples, and the Last Supper [FIG. 88]. The two remaining scenes on the outside of the foot belong among them chronologically: the Agony in the Garden and finally the Arrest



FIGS. 86, 87, 88



FIGS. 89, 90

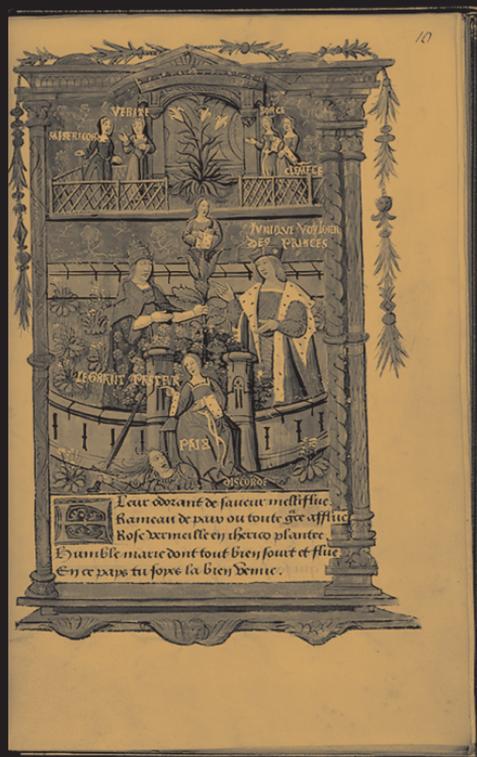
of Christ. The princely user of this object was not presented with a logical or chronological sequence of scenes but was expected to try and discover the correct order of the scenes on the inside and outside of the foot.

If the foot and the spherical middle section are also separated from each other with a simple turn of the bayonet fitting, the bottom of the sphere displays a small circular relief of Christ before Caiaphas in a composition reminiscent of a 1512 engraving by Dürer. It is the scene that follows the Arrest of Christ and prepares the viewer for the rest of the Passion sequence, which continues on the outside of the sphere. Here one finds the dome of a Gothic church with a gallery, balustrade and pinnacles running around it, along which the user could promenade in his or her mind's eye. As on the foot, here are more miniature scenes from the Passion: the Flagellation and the Ecce Homo, each in a vaulted niche and surrounded by Gothic tracery [FIG. 89]. The underside of the sphere consists of undulating openwork branches held together by a cord. It is not clear what, if anything, is behind those branches. The sphere itself can be opened like a prayer nut, providing the user with the grand finale of a new micro-spectacle. The top half contains two small doors decorated with a flat relief of an Ecce Homo, with Christ being shown to the people and tried. The doors open to reveal a minuscule Crucifixion [FIG. 90]. The bottom half shows the risen Christ, the three Marys by the empty tomb, and Christ as a gardener appearing to Mary Magdalen.

He appears again beneath this stage, descending into Purgatory.

This lengthy description shows that the use of this object required a fairly complex series of actions that led the viewer step by step to the denouement at the heart of the object, meditating on the story of Christ's Passion all the while. The fact that the sequence of events is not immediately apparent forces the user to work out the next step each time: what is the next scene going to be, and where is it? Assistance in the search for the correct sequence and meaning of the micro-scenes is provided by the texts in and around the scenes that serve as reminders for the identification and the associated contemplation.⁴³ Although Passion devotion was the guide for the use of the object, the user was constantly being challenged by the minute scale of the scenes and by their hidden nature. It was in that challenge, that voyage of discovery, that there was an element of play that transcended the purely devotional and was comparable to the engraved appeal to 'Soket vaer ghi vilt' on the silver covering of a prayer nut [FIG. 91].⁴⁴

The playful search manifests itself straight away with the mechanical opening of the lily, a device that may have been inspired by contemporary festive displays in which automatons and other contraptions made a public spectacle even more breathtaking. A famous example was Hesdin Castle with its entertainment mechanisms installed by the counts of Artois and their fourteenth and fifteenth-century successors, the dukes of Burgundy, where visitors



FIGS. 91, 92



FIGS. 93, 94

were subjected to devices performing practical jokes.⁴⁵ At the 1514 marriage feast in Paris for the English princess Mary Rose Tudor (who, intriguingly, had previously been engaged to the later Emperor Charles V) and the French King Louis XII, the couple's emblems of a rose and a lily opened mechanically, and as the public watched breathlessly the two flowers rose up to a throne, where the rosebud opened to reveal a small, sumptuously clad young girl.⁴⁶

A miniature of this spectacle shows that the resemblance to micro-carving is not that far-fetched [FIG. 92]. The same principle, but in a simpler and profane form, is also found in a king carved of boxwood in a late seventeenth-century chess set [FIG. 93]. When the finial of the flower-shaped piece is removed, its four parts fall open to show a small jester baring his buttocks to the loser of the game [FIG. 94].⁴⁷

Apart from the actions of assembling and disassembling and seeking for a devotional way past the minute scenes, there is a light-hearted aspect of play inherent in the traceries and floral openwork patterns on the outside of the 'monstrance', and of most of the other boxwood devotional objects too, albeit in a simpler form. While they whet the viewer's curiosity as to what is behind this web of patterns – a relic, a revelation perhaps? – the complexity of those decorations, both in micro-carving and on a monumental scale in church architecture, also takes on the nature of a puzzle, memory game, puzzle canon or witty diversion.⁴⁸ It is an aesthetic that alludes to a higher, divine ordering system that elicits amazement and gives pause for thought through its combination of

almost mathematical regularity and surprising twists and turns.⁴⁹ It can help explain why these 'old-fashioned' Late Gothic patterns remained popular for so long in the first half of the sixteenth century, for the vocabulary of the new *all'antica* style imported from Italy did not have an equivalent of such playful and integral ornamentation. That is why the 'antique' plays only a marginal role in micro-carving [FIG. 95].

The devotional 'monstrances' of Emperor Charles V and Duke Albrecht V were novelties, newly minted artistic objects. In their innovative form, scale and complexity they are comparable to a few very delicate, late sixteenth-century *Drechselarbeiten* from Berchtesgaden in the Bavarian *Kunstammer*, of which there are specimens in the art collections of Schloss Ambras [FIG. 96]. Surprisingly, some of these showpieces in the Ambras inventory are described as 'geschnizltes Spiel', although they were not made for a specific game.⁵⁰ The word *Spiel* is an explicit allusion to the playful nature evoked by the complex refinement with which they were constructed, which could once again stimulate exploration and amusement.⁵¹

Although less sophisticated than those in Charles V's 'monstrance', other devotional micro-carvings also have amusing details of this kind, which suggests that play and entertainment are a key concept for a proper understanding of the users' interaction with them. Elements that are humorous and provocative are the small lions, normally the proud supporters of robust sacred objects, who with their tongues lolling out of their mouths have succumbed under the 'weight'



FIGS. 95, 96



FIGS. 97, 98

of miniature altarpieces and tabernacles in Toronto and London [FIG. 86].⁵² The small movable rings already encountered in several prayer nuts are further illustrations of this playfulness [FIG. 54]. As we have seen, while they served as a witty display of artistic bravura on the micro-carver's part,⁵³ they also introduced a 'living' element into the 'dead' micro-scenes. It tempts the user, and possibly others of the company as well, to act and make the ring move. In that sense it establishes a subtle connection between the user's real world of motion and that of the miniature scene, a visual pun on which the user could hang his or her mnemonic *catenae* of thought associations, memorizations and reflections.⁵⁴

A unique, tailor-made miniature lantern that may have been made for someone called John in the entourage of King Henry VIII, and may be of English workmanship too, allows the user to toy with a small cylinder at the heart of the lantern [FIG. 97].⁵⁵ Rubbing a finger along a peg at the bottom of the object rotates the cylinder, which turns out to consist of three tiny figures placed back-to-back, John the Baptist, John the Evangelist and Christ, who are held together by a text banderole with a central message of salvation history: the Lamb of God that takes away the sins of the world. The apt inscriptions on the exterior relate to the divine light, turning the little object into a lantern for the user's spiritual enlightenment.⁵⁶

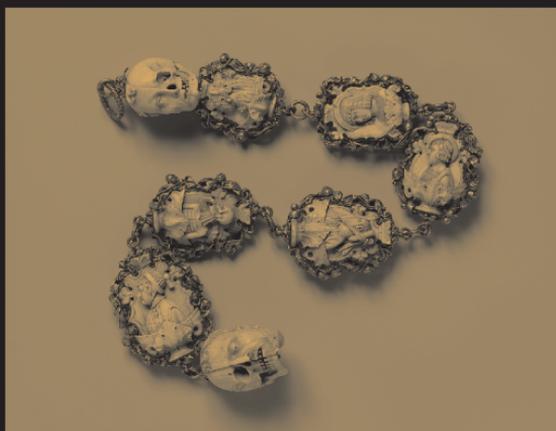
A few larger prayer nuts that are not strictly spherical but are constructed as regular polyhedra of linked small and large medallions invite the user to play a different game. The smaller medallions

consist of openwork, while the larger ones contain small reliefs that are alternately recessed or raised.⁵⁷ One of them can be folded upwards to unlock the object, but it takes a while to work out which one, so the user discovers the meaning and interrelationship of the small scenes while playing with them. The recessed tondi in a prayer nut in the Abegg-Stiftung, for example, depict the Old Testament typologies of the New Testament reliefs in the raised ones, while two prophets with empty banderoles mark the medallion that is the lock [FIG. 98].⁵⁸ Lifting that scene to open the prayer nut brings their prophecy to light, as it were, in the micro-carving forming the core of the object. The rare execution of this prayer nut, of which only three other examples are known, has a striking parallel in form and format with ivory dice of the same period, thus establishing a direct connection with the game of dice. There is a close resemblance to an ivory dice with alternating polyhedral surfaces bearing the numbers, which is thought to have belonged to Emperor Charles V [FIG. 99].⁵⁹

There is also a resemblance to dice in the beads and prayer nuts of several paternosters of the *de luxe* sort made for Henry VIII of England and Floris van Egmond. They are called 'Bildrosenkranz' because the sides of the beads are decorated with images and texts.⁶⁰ Each bead is made up of five diamond-shaped fields with a prophet, an apostle and two biblical scenes, with banderoles winding between them inscribed with the Credo and biblical texts [FIGS. 100, 111, 134].⁶¹ In order to read the scenes and the texts the user has to twist the beads between the



FIGS. 99, 100



FIGS. 101, 102

fingers in a playful chain of actions that combine movement (twisting, opening), looking (image), memorizing, reciting (text and image) and internalization.⁶²

The most curious object among all these boxwood religious toys is a large *memento mori* pendant in the form of Christ's head with a skull on the back. An ingenious spring mechanism activated by pressing on the head releases a small figure of Christ as Man of Sorrows from the top of the head [FIG. 101]. This playful jack-in-the-box can prompt the user to reflect on the Passion, on his or her own mortality, and on Christ's triumph over death.⁶³ The size of this object means that it would not have been a paternoster bead, as some prayer nuts and similar ivory *memento mori* beads were [FIG. 102], but an autonomous devotional plaything.

'SUB SPECIE LUDI'

Such connections between devotion and play may appear surprising, but in the experiential world of the Middle Ages both were extensions of each other, because they united the pleasing with the useful and were a distraction from the serious things in life and from the regularity of work.⁶⁴ *Ludus* or play created space in which to think freely, to memorize, to meditate, to teach and to compose, and was certainly not seen solely as idle or sinful.⁶⁵ Thomas Aquinas, for example, regarded theological study and contemplation as a form of play, a flight from the cares and distractions of daily life, while Nicholas of Cusa in his *Dialogus de ludo globi* of 1460 described the road to knowledge as a game with a rolling ball.⁶⁶ Play that enhances

the well-being and virtue of the player and is called *eutrapelia* also appears to be the basis of the scene of three children playing in the center of Geertgen tot Sint Jans's *Holy Kinship*.⁶⁷ The message there has been interpreted as an invitation to the donors of the altarpiece, who may have been the Haarlem Knights of St John, to surrender to a spiritual game to make the strict life of a religious order more pleasant [FIG. 103].⁶⁸ Seen in this light it is not even going too far to assume that the very combination of the playful and the devotional was a mainspring behind the development of new, ingenious devotional objects like prayer nuts.⁶⁹ The idea that play was the basis of knowledge and creation was a classical and biblical notion that was well enough known in the Middle Ages through the image of divine wisdom creating the earth when in a playful mood.⁷⁰

The cultural historian Johan Huizinga was the first to investigate play as an essential element of culture.⁷¹ Although parts of his study have been criticized and revised in recent decades, many of his observations are still valuable.⁷² For example, he defined play as 'a free activity standing quite consciously outside "ordinary" life', 'not serious' by nature, and one that 'proceeds within its own proper boundaries of time and space'.⁷³ In order to play the player steps out of his 'ordinary' world and into that of the game, a 'sacred space' that Huizinga called the 'magic circle', where different laws apply than in the 'real' world, and where there is a limited, temporary perfection.⁷⁴ According to him, that magical play space is often bound up with sacred activities, rituals, religion and mystery, which



FIG. 103



FIG. 104

are also acted out in a separate space according to rules of their own.⁷⁵ Huizinga's concept of the 'magic circle' is nowadays applied less strictly and with more fluid 'boundaries', but it has not lost its *raison d'être*.⁷⁶ His concept is still valid in connection with playing with devotional objects and losing oneself in a separate, personal world of meditation and inner sight to which the use of 'spiritual toys' can lead. Links can even be made to modern play activities, such as video games.

Even more to the point, recent research has demonstrated that such digital games and the experiences of the players often have a strong mythical, spiritual or religious dimension, even among avowedly non-religious participants in the online gaming community.⁷⁷ Those games, like the devotional one in which the boxwood paternosters, prayer nuts and other little objects with their miniature scenes invite the user to participate, are characterized by make-believe, role play, identification with heroes from another, mythical world, and by a temporary but very intense experience of immersion or incorporation in that world [FIG. 104].⁷⁸ The result is a 'beyond-the-object-interactivity' and a multi-sensorial experience of heavenly bliss. In the words of a young gamer of *Guild Wars*: '[...] and [I] came across this massive, ruined cathedral with this gorgeous stained glass window that was mostly intact. I just stopped, and stared at it. I worked my way around it as much as I could to see it from all angles and ended up on a rise a little above it, just watching it. I don't remember the time of day, but it might have been like a sunset and I swore I could

practically feel the breeze on my face and hear the wildlife. If I could pay to experience that in real life I would. And I would pay a lot. It was a real moment for me, a real experience that I carry with me.'⁷⁹

- 1 Schweitzer 1981, p. 369: '[...] tusent selen siczen in dem himelrich uff einer nadel spicz'('[...] one thousand souls sit on the point of a needle in the kingdom of heaven'); Borgstädt 1986. For the playful side see Carruthers 2014, p. 24.
- 2 See, for instance, the modern English saying: 'How many angels can dance on the head of a pin?', and the serious attempts to calculate the relative density of angels documented at <https://www.improbable.com/airchives/paperair/volume7/v7i3/angels-7-3.htm>.
- 3 Bucher 1976, p. 82, speaking about delicately engraved Gothic designs: 'In actual execution in wood or metal and even in stone these objects reached a state of ethereal intangibility.'
- 4 Commoner and larger units of measure were derived from parts of the human body, such as yard and ell, and thumb (inch) in other languages, including Dutch; see Verhoeff 1982, pp. 112, 120, and Daub 1979, pp. 61–63.
- 5 Scholten 2011c, p. 10. Also Stewart 1993, p. 56.
- 6 The English equivalent, 'in a nutshell', was first used in a printed text in the 1570s, but the nutshell as a denominator of something small had become established some considerable time before that; cf. Guiffrey 1894–96, vol. 1, p. 153, no. 548 ('Item, deux petites pièces, du gros d'une noix, de mine'). See also *Woordenboek der Nederlandsche Taal*, s.v. 'noot' and 'neut'.
- 7 Pliny 2004, pp. 158–59 (bk. VII, 85).
- 8 Carruthers 2014, p. 173 (*brevitas versus amplificatio*).
- 9 For example, a fifteenth-century woodcut of St Florian with a miniature city at his feet that he is saving by extinguishing a fire; see Areford 2010, fig. 27.
- 10 Philostratus, pp. 229–30 (bk. II, no. 22). Guépin 1988. Some sources even say that the mythical sculptor was a pygmy; see Carr 1960, p. 252, note 46.
- 11 Lévi-Strauss 2008, p. 585; Autsch et al. 2014.
- 12 Stewart 1993, p. 56.
- 13 Ibid., p. 55.
- 14 Carruthers 2014, pp. 172–76.
- 15 Busch 1997, p. 76; Keller & Goetze 1870, p. 244: '[...] nach dem wir auff den thurn/ beyde gelassen wurn/ auff dem wir beyde sahen/ die landschafft ferr und nahen' ('After we were both left on the tower, whence we both saw the landscape far off and close by'); Prosperetti 2009, pp. 41, 42, 142.
- 16 Carruthers 2014, p. 173.
- 17 Prosperetti 2009, p. 93, note 88.
- 18 Here quoted after the translation from the Latin in Carruthers 2014, p. 39. See also Panofsky & Panofsky-Soergel 1946, pp. 63–65 (*De rebus in Administratione sua Gestis, XXXIII*).
- 19 See the motto of this book, p. 12.
- 20 Bachelard 1994, p. 158: 'To use a magnifying glass is to pay attention, but isn't paying attention already having a magnifying glass? Attention by itself is an enlarging glass.'
- 21 Such as the man to the right of the Adoration in the devotional tabernacle (triptych) in the Wallace Collection, and the one in the middle of a scene of Christ before Pilate in a prayer nut in the Kunsthistorisches Museum in Vienna, inv. no. K 4206.
- 22 Mann 1992, pp. 31–57.
- 23 See *Woordenboek der Nederlandsche Taal*, s.v. 'bril'.
- 24 Kues 1989, vol 3 (*De beryllo*, p. 5): 'Beryllus lapis est lucidus, albus et transparentis. Cui datur forma concava pariter et convexa, et per ipsum videns attingit prius invisibile. Intellectualibus oculis si intellectualis beryllus, qui formam habeat maximam pariter et minimam, adaptatur, per eius medium attingitur indivisibile omnium principium.' For the English translation from Hopkins 1998, pp. 792–93 (*De beryllo*, p. 3) see http://urts99.uni-trier.de/cusanus/content/fw.php?werk=7&ln=hopkins&hopkins_pg=792.
- 25 Bucher 1976, pp. 72 ('[...] antirational edifices became so extravagant that they could only be realized in the structurally forgiving realm of buildings whose extraordinarily daring elevations necessitated small size'), 74 ('The reduced size was counterbalanced by enrichment of details, sophisticated treatment of materials and daring designs').

- 26 For the early use of lenses see, among others, Enoch 1998; Kriss & Kriss 1998, pp. 907–08; Mann 1992, pp. 17–57; Rosen 1956.
- 27 Cf. Diemer *et al.* 2008, vol. 1, nos. 809 ('Augenglas') and 1422.
- 28 See the chapter by Scholten, pp. 13–79 and note 100.
- 29 Bachelard 1994, pp. 156–62; Stewart 1993, pp. 54–56: '[...] the daydream of the microscope: the daydream of life inside life'.
- 30 Stewart 1993, p. 69.
- 31 *Ibid.*, p. 48. Gombrich 1984, p. 9, drew attention to the connection between the 'ease of construction' of a work of art and the 'ease of perception', namely that an object simply made is observed simply, whereas a complex one, like a micro-carving, demands a greater visual effort.
- 32 Bucher 1976, p. 82: 'Thus the reliquary may suddenly switch scale and grow into a much larger building.'
- 33 DeLong 1981; DeLong *et al.* 1994; Tegano *et al.* 1996.
- 34 Kramer *et al.* 2013, for the wholesome effect of losing one's sense of time: 'Meditation led to a relative overestimation of durations. Within the internal clock framework, a change in attentional resources can produce longer perceived durations.'
- 35 Ramakers 2015, pp. 162–64; Maurice & Maurice 1980, p. 145, with reference, among other things, to the popular little prayer book by the Dominican Bertold of Regensburg, *Das andächtig Zeitglöcklein des Lebens und Leiden Christi nach den 24 Stunden nachgeteilt*. There are late fifteenth-century editions known from Basel, Nuremberg, Cologne and Paris. The first Latin edition, *Horologium Devotionis circa vitam Christi*, is from 1488 (Cologne, published by Ulrich Zel). 'Saying a pater noster' is also a form of measuring the passage of time.
- 36 Bachelard 1994, pp. 159–68; Stewart 1993, pp. 44–53; Carruthers 2014, p. 173: '[...] copious descriptions of quite small decorated artefacts'.
- 37 See Appendix, pp. 588–602; Scholten 2012a; Penniman 1820 (with thanks to Angela Glover for drawing my attention to this text); Carruthers 2014, p. 174, for a detailed description of the ornate chalices on the table at Belshazzar's feast from the late fourteenth-century poem *Cleanness*. See also Vasari's account of the miniatures by Giulio Clovio; Vasari 1963, vol. 4, esp. pp. 246–48.
- 38 Jacobs 2012, pp. 4–6; Rimmele 2010; Ramakers 2015, p. 158; Krischel 2014; Rimmele 2014.
- 39 Rimmele 2010, pp. 238–40, 261.
- 40 Thornton 2015, pp. 186–95.
- 41 Turin, Galleria Sabauda, inv. no. 8 (c. 1470, painted for Tommaso Portinari).
- 42 Schiller 1972, vol. 2, pp. 136–37, for the meaning of the pelican as a symbol of Christ's life-giving blood sacrifice on the Cross.
- 43 On making and 'reading' a medieval work of art as a journey or quest see Carruthers 2010. Cf. Areford 2010, pp. 85, 86, fig. 33, for an instruction manuscript with 'flip-up illustrations' for memorizing.
- 44 See the chapter by Scholten, pp. 13–79. The inscription on the outside of a small prayer nut, cat. no. 2, 'INVENIETIS INFANTEM PANNIS INVOLPTVM' ('Ye shall find the babe wrapped in swaddling clothes'; Luke 2:12), also plays with the idea of seeking and finding.
- 45 Franke 1997.
- 46 Wickham 1974, pp. 169, 170, and fig. 44.
- 47 Himmelheber 1972, no. 16.
- 48 Westgeest 1986; Kavalier 2012, pp. 90, 91.
- 49 Bredekamp 2000, p. 42 (on the 'beauty' of *Drechselarbeiten* due to the difficulty of making them). Kavalier 2012, pp. 51, 52, 68, 80, 100: 'Amazement and wonder were among the goals of this aesthetic. There is a sense of order or intellectual arrangement, but it is one that must be sought out, explored.' Carruthers 2014, p. 192: '[...] about how human art surpasses nature, and how the puzzles and enigmas artefacts create cause us in the best sense to stop, stare, puzzle, and think, possibly for our greater benefit'.

- 50 Volk 2008, p. 276, figs. 5, 6; Diemer *et al.* 2008, vol. 2, pp. 280, 281.
- 51 For the etymology of the words *spel*, *Spiel*, 'spell' etc. see the *Online etymology dictionary*, s.v. 'spell'. The Old English noun 'spell' (= story, saying, tale, history, narrative, discourse, command) is derived from the Proto-Germanic *spellam*, Old Saxon *spel*, Old Norse *spjall*, Old High German *spel* and the Gothic *spill* in the sense of report, fable, tale, myth. From around 1200 it also came to mean a statement or utterance. It was only around 1570 that it took on the senses of an incantation, a 'set of words with supposed magical or occult powers', and 'charm'.
- 52 Thornton 2015, p. 178, fig. 1; Mann 1981, pl. 69.
- 53 See the chapter by Scholten, pp. 13–79.
- 54 Carruthers 1998, pp. 115 ('playful chain-making'), 146, 147, 150, 163–67.
- 55 With Sam Fogg, London, 2014, and on loan to the British Museum. Dimensions 71 x 36 x 36 mm. I am grateful to Sam Fogg for drawing my attention to this object and allowing me to study it.
- 56 The inscription 'Vive Le Roy' and the Tudor roses suggest a link to the English court. Carved on the exterior: 'LUCERNA PEDIB[us] MEIS VERBU[m] TUUM ET LUMEN SEMITIS MEIS * PSALM 118 * VIVE LE ROY * LUX VENIT IN MUNDUM ET DILEXERUNT HOMINES MAGIS TENEBRAS QUAM LUCEM' ('Thy word is a lamp unto my feet and a light unto my path * Psalm 118 * Long live the King * Light is come into the world and men loved darkness rather than the light'). Carved around the interior spindle on a swirling banderole: 'ECCE AGNUS DEI, ECCE QUI TOLLIT PECCATA MUNDI' ('Behold the Lamb of God who takes away the sins of the world'). On the underside, ink markings now illegible. Written in ink across the undersides of the feet, in partially illegible lettering: 'CE – C – DEI – JA – BI' [?]. With thanks to Matthew Reeves for sharing his research on the inscriptions with me.
- 57 Cat. nos. 33, 34.
- 58 Wetter 2011, pp. 15–26.
- 59 Compare, for instance, the chance shape of a stone nodule in Ulisse Aldovandri's *Musaeum metallicum* of 1648, Bredekamp 2000, p. 43.
- 60 Jäger 2010, pp. 201, 202.
- 61 Cf. a string with two openwork Ave beads and a paternoster bead at Musée de Cluny in Paris, inv. no. OA 381; and the hitherto unpublished string with five openwork Ave beads and a finger ring in the Wadsworth Athenaeum Museum of Art in Hartford, inv. no. 1953.259. With thanks to Ingmar Reesing.
- 62 Jäger 2010, p. 206.
- 63 Cat. no. 59.
- 64 Carruthers 2014, pp. 141–42, 172.
- 65 Van Egmond & Mostert 2001; Arcangeli 2003; Sonntag 2013; Carruthers 2014, pp. 76–78.
- 66 Carruthers 2014, pp. 17–27; Bredekamp 2007, p. 112; Findlen 1990; www.Cusanus-Oper.de, and for the English translation: http://urts99.uni-trier.de/cusanus/content/fw.php?werk=23&ln=hopkins&hopkins_pg=1181.
- 67 Arcangeli 2003; Decker 2016. *Eutrapelia* has a modern counterpart in the concept of 'flow', which can engender well-being in the context of play; see, among others, Sherry 2004; Voiskounsky *et al.* 2004.
- 68 The three boys are identified by their attributes or instruments of martyrdom as Simon Zelotes (saw), John the Evangelist (chalice) and the James the Greater (wine cask); see Decker 2016. For children's games in the Middle Ages see Drost 1914; Willemsen 1998; Willemsen 2008; Willemsen 2009.
- 69 In 1795, Friedrich Schiller, 'the founding father of ludology', saw the creation of works of art as an expression of an innate love of play; see Huizinga 2008, p. 199.
- 70 Bredekamp 2007, p. 112; Carruthers 2014, p. 21 (referring to Proverbs 8:30–31). Heraclitus saw world events as a child playing a board game.
- 71 Huizinga 2008; Huizinga 1955.
- 72 Callois 1961; Ehrmann 1968; Calleja 2015.
- 73 Huizinga 2008, pp. 35–37; Huizinga 1955, p. 13; Goldschmidt 2014, pp. 121–50.

- 74 Huizinga 2008, pp. 37, 38.
- 75 *Ibid.*, pp. 42, 43, 45–55.
- 76 Aupers 2015; Frissen *et al.* 2015b.
Also Walton 1990 on ‘the game of make-believe’ as the basis of visual art, following a line of thought based on Huizinga.
- 77 Aupers 2016, pp. 84, 85, 88–91; Frissen *et al.* 2015b.
- 78 Frissen *et al.* 2015b, p. 23, speak of ‘metaphorical spaces’; Aupers 2015; Calleja 2015, pp. 220–22 (on incorporation versus immersion); Frissen *et al.* 2015b, pp. 22, 23.
- 79 A player of *Guild Wars*, a ‘massively multiplayer online role-playing game’ (MMORPG), quoted from Calleja 2015, p. 222.