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## **More than people and pots: identity and regionalization in Ancient Egypt during the second intermediate period, ca. 1775-1550 BC**

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## SCARAB AND SEAL DESIGNS

The present chapter analyses the designs incised on the base, namely on their flat area that is in contact with the supporting surface, of scarabs and seals. Scarabs were usually beetle-shaped, while seals were not only beetle-shaped, but also cylindrical, or rectangular, or shaped like cowrie shells.<sup>1</sup> Seals were impressed, on the part of their base, on clay on vessels and other containers such as wooden boxes, baskets, to authenticate and seal off their contents when they were transported or went into storage; they were also impressed on documentation on papyri and ostraca, and on doors when these needed to be sealed.<sup>2</sup> The impressions left on these clay sealings, which because of their use are found mostly in settlement contexts,<sup>3</sup> are also included in the analysis, because the designs used are similar to the ones incised on scarabs and seals.

For both the Late Middle Kingdom and the Second Intermediate Period, scarabs used in administration bear also official titles and names or royal names.<sup>4</sup> These scarabs allow to reconstruct the administrative system, that was still centralized during the Late Middle Kingdom, which was actually when their large-scale use started.<sup>5</sup> The scarabs used for administrative purposes during the Second Intermediate Period are in a much smaller number.<sup>6</sup> Especially when bearing royal names, scarabs have been used for dating purposes.<sup>7</sup> Nevertheless, for both royal and non-royal scarabs and seals, there

1 See examples in: Martin 1971.

2 Bietak 2004; Collon, Lehmann, and Müller 2013; Marée 2013; Martin 1971; Martin 2004; Reali 2013; Tufnell 1975.

3 Ben-Tor 2007; Hayes 1953, 191; Martin 1971; Petrie, Brunton, and Murray 1923, pls. LXIII–LXV; Petrie et al. 1891, pls. VIII–X; Tufnell 1975; Von Pilgrim 1996, figs. 98–104.

4 Ben-Tor 2007, 36–41, 103–12; Ben-Tor 2010; Bietak 2004; Krauss 1996; Martin 1971; Quirke 2004; Quirke 2007; Ryholt 1997, 34–65.

5 Ben-Tor 2007, 5–7; Martin 1971; Williams 1977, 136–37.

6 Ben-Tor 2004, 33; Ben-Tor 2007, 44–48; Quirke 2004; Von Pilgrim 1996, 303–8; Wegner, Smith, and Rossell 2000.

7 Ben-Tor 2004; Ben-Tor 2010; O'Connor 1985; Krauss 1996; Ryholt 1997, 34–65; Ryholt 2010; Wegner 2004.

is always the possibility of heirlooms and fossils, namely scarabs found in contexts later than the date of their production and use.<sup>8</sup>

Scarabs, sometimes mounted on gold rings, could function also as amulets, thus with religious purposes, and as such are especially found in funerary contexts as burial equipment, thus as funerary scarabs and carrying funerary epithets.<sup>9</sup> Their large use as funerary scarabs also started during the Late Middle Kingdom, likely because changes in burial customs created the need for relatively cheap and easily accessible apotropaic objects.<sup>10</sup> Amulets, bearing the same designs as the ones found on scarabs, were often shaped as cowroids, namely cowrie-shells with a flat base.<sup>11</sup> During the Second Intermediate Period, when funerary and amulet scarabs were more common than the administrative ones,<sup>12</sup> these amulets were shaped also like double or multiple scarabs, namely two or more scarabs joined at their sides,<sup>13</sup> or other animals such as hedgehogs.<sup>14</sup> These amulets have also been included in the present analysis, because the designs they bear are informative.

Both administrative and funerary scarabs were widely distributed during the Late Middle Kingdom; they also bear similar motifs. This further suggests a centralized administration and centralized distribution, that is to say that scarabs were mostly produced in the area of the capital and distributed from there.<sup>15</sup> For the Second Intermediate Period, the similarity to Canaanite scarabs, as well as the presence of Canaanite scarabs, has been noted, especially in the Eastern Delta.<sup>16</sup> This shows a regional tradition of the area, from where most of the scarabs of the period come from.<sup>17</sup> The presence of a scarab workshop in Tell el-Dab'a during the Second Intermediate Period has also been demonstrated, on the basis of the peculiar features of the scarabs unearthed at the site: the way their head, back, legs and designs are realized shows a characteristic local style, which differs between the Early and the Late Second Intermediate Period and suggests the existence of two different

8 See various examples in: Ben-Tor 2007; Mlinar 2001b.

9 Ben-Tor 2007, 5; Ward and Bishara 1978, 43–47.

10 Ben-Tor 2007, 5–6; Bourriau 1991a.

11 See examples in: Ayrton et al. 1904; Ben-Tor 2007; Brunton, Gardiner, and Petrie 1930; Brunton and Morant 1937; Downes 1974; Engelbach et al. 1915; Mlinar 2001b; Petrie and Brunton 1924; Petrie, Quibell, and Spurrell 1896; Petrie, Thompson, and Crum 1907.

12 Ben-Tor 2007, 44–47.

13 See examples in: Ben-Tor 2007; Miniaci 2011; Miniaci and Quirke 2009.

14 See examples in: Ben-Tor 2007; Bietak, Mlinar, and Schwab 1991; Mlinar 2001b; Petrie and Brunton 1924.

15 Ben-Tor 2007, 5–6; Martin 1971; Williams 1977, 136–38.

16 Ben-Tor 2004; Ben-Tor 2007, 43 and 113; Mlinar 2001a; Mlinar 2004; Sartori 2009.

17 Ben-Tor 2007, 113.

workshops in the two phases.<sup>18</sup> The existence of a Theban workshop, whose scarabs resemble the ones of the early part of the Middle Kingdom,<sup>19</sup> during the Second Intermediate Period has also been suggested, but only royal scarabs can be attributed to that with certainty.<sup>20</sup> This scarabs was mostly likely active during the Late Second Intermediate Period, as demonstrated by the fact that the royal scarabs attributed to this workshop bear names of kings of the Seventeenth Dynasty.<sup>21</sup>

The fact that administrative and funerary scarabs bear similar motifs, and are not clearly distinguished, also demonstrate that the use of scarabs was interchangeable.<sup>22</sup> Because the function of the same scarab could indeed vary over time, items were kept for more generations, because they were still in use, or reused, or kept as heirlooms, ending up in contexts later than their date of production and use.<sup>23</sup> Considering that most scarabs have been found in tombs, this means that the tombs can date to a period later than the period when the scarabs were made. In the present work, heirlooms and fossils are included in the analysis, because the aim is to study the material culture in use during the Late Middle Kingdom and the Second Intermediate Period. Moreover, scarabs were used in jewellery items such as necklaces and bracelets. These items are found mostly in burial contexts, because were used as funerary equipment. However, scarabs used as amulets and beads, and not bearing designs, have been included in the analysis of the beads.

Typologies of scarabs have been elaborated based on the shape of the head, the back, and the side,<sup>24</sup> and on how naturalistic or stylized they look. The head includes: the clypeus, namely the broad plate at the front of the head; the plates at the sides of the clypeus; the eyes. The back includes the thorax, namely the upper part of the back, and the two elytra, namely the two hardened forewings that protect the membranous hind wings of the beetles. On the side are represented the legs of the insect. Naturally, including also these features in the analysis would have been more informative than examining only the designs visible on the base.<sup>25</sup> However, not enough published information is available to allow for such an analysis. The designs visible on the base of scarabs and on seals have been specifically represented in pub-

18 Bietak, Forstner-Müller, and Mlinar 2001; Mlinar 2001b; Mlinar 2004.

19 Ben-Tor 2007, 113.

20 Ben-Tor 2007, 113; Quirke 2004.

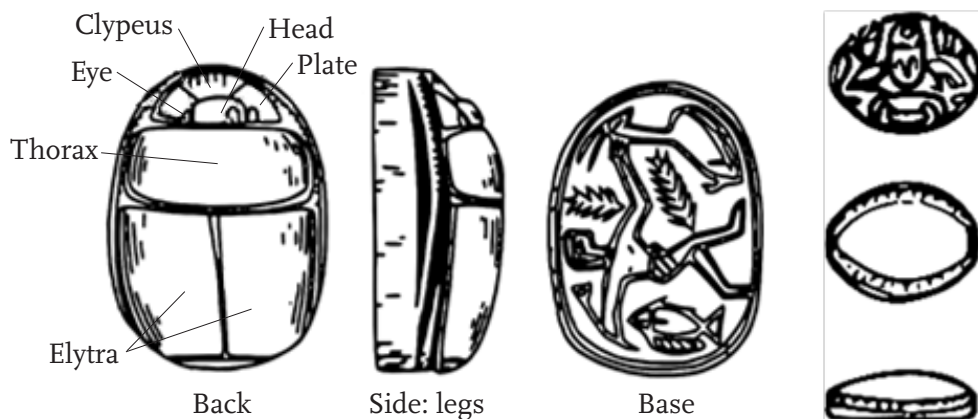
21 Ben-Tor 2007, 110–13.

22 Ben-Tor 2007, 5–8; Williams 1977, 136–38.

23 Ben-Tor 2004, 28; Ben-Tor 2007, 5–7; Williams 1977, 136–38.

24 Mlinar 2004; Tufnell, Martin, and Ward 1984; Ward and Bishara 1978.

25 As an example, Mlinar has been able to detect the presence of a local workshop of Tell el-Dab'a based on these features: Mlinar 2001b, Mlinar 2004.



Drawing 2 (left): Main parts of a scarab. Drawing after Ben-Tor 2007.

Drawing 3 (right): Example of a cowroid seal. Drawing after Ben-Tor 2007.

lications, or are visible in the pictures of scarabs and seals.<sup>26</sup> Collections of scarabs and seals, as well as of impressions left on sealings, have also been published.<sup>27</sup> The typology adopted in most of these collections does not vary much,<sup>28</sup> and has been followed also in the present work.<sup>29</sup>

Between the Late Middle kingdom and the Second Intermediate Period there are differences concerning which scarab and seal designs are more common and how they look like, as well as how the different parts of the scarabs, i.e. the head and the back and the sides, are made.<sup>30</sup> The size of the scarabs has also been taken into account to study their development during these chronological periods.<sup>31</sup> It has been suggested that in time they become smaller, so that the larger they are, the earlier they are; however, this suggestion has been criticized on the basis of scarabs that can be dated with certainty, which show that later scarabs are not always smaller than earlier ones.<sup>32</sup>

26 See, for example in the publications of Lahun, Esna, and Tell el-Yahudiyah: Downes 1974, 56–66; Griffith 1890, pl. X; Petrie, Brunton, and Murray 1923, pls. LXIII–LXV; Petrie and Duncan 1906, pls. VI–IX; Petrie, Griffith, and Newberry 1890, pl. X; Petrie et al. 1891, pls. VIII–X.

27 Ben-Tor 2007; Martin 1971; Martin 2004; Newberry 1906; Newberry 1907; Tufnell 1975; Tufnell, Martin, and Ward 1984.

28 This typology has been combined with a typology based on the way the head, the back, and the legs are executed in: Mlinar 2001b; Tufnell, Martin, and Ward 1984; Ward and Bishara 1978.

29 In detail, the typology followed in the present analysis is the one found in: Ben-Tor 2007.

30 Ben-Tor 2007, 41 and 102–13; Martin 1971; Mlinar 2001b; Tufnell, Martin, and Ward 1984.

31 Tufnell 1975; Tufnell, Martin, and Ward 1984; Ward and Bishara 1978.

32 Ben-Tor 2007, 9; Ryholt 1997, 34–65.

This shows that the distinction is not always straightforward, and problems especially arise when scarabs are found in contexts where archaeological material from different chronological periods are mixed together.<sup>33</sup> Moreover, no distinction has been made between the scarabs of the Early and of the Late Second Intermediate Period.<sup>34</sup> Lastly, only published material has been used for the present research, and the quality of the data published is often not good enough for using scarabs for dating purposes. Therefore, only contexts that have been clearly dated to one of the three chronological phases analysed through other means have been examined, while undated contexts have been excluded and no attempt to dating them through designs has been made.

Furthermore, for part of the scarabs and seals, whose design can be dated to the periods relevant to the present research, the original context is not known, because they have been acquired by museums and the original context is unknown,<sup>35</sup> or because they come from secondary deposits, where they were discarded after having been used.<sup>36</sup> Designs from these scarabs and seals are not included in the analysis, because they are not informative as far as the relationships between sites are concerned. Therefore, only designs from scarabs and seals from dated archaeological contexts have been examined.

Nevertheless, finding similar designs at two sites does not necessarily mean that these sites were in direct contact, nor that the designs were specifically brought by somebody from one site to another. It only means that these sites shared a similar style of material culture, which could reach them in a more indirect way.<sup>37</sup> This is due to the fact that the archaeological bias and the difficulty in dating part of the contexts deprives us of data and, therefore, of the possibility to reconstruct a precise line of direct contacts.<sup>38</sup>

Finally, scarabs and seals were nearly always made of steatite or faience:<sup>39</sup> the materials used were standardized or locally procured. Therefore, the connections created through the occurrence of steatite and faience scarabs are not very informative or meaningful and have not been analysed. Other materials used to produce scarabs and seals, such as amethyst, jasper, feldspar, lapis lazuli, turquoise, and obsidian, have a specific source or a rarely found or imported. Hence, they have been examined to study the networks that their occurrence creates.

33 Ben-Tor 2007, 6–7, 44–45.

34 Not even in Ben-Tor's publication.








35 See examples in: Newberry 1906; Newberry 1907; Petrie 1917.

36 Ben-Tor 2007, 6–7; Bietak 2004; Von Pilgrim 1996, 254–61; Wegner 1998.

37 Brughmans 2013, 638–39; Sindbæk 2007b, 66; Sindbæk 2013, 74–76, 82.









38 Sindbæk 2013, 72.

39 Tufnell, Martin, and Ward 1984, 38–42; Petrie 1917, 8–9.








<i>Design type</i>	<i>Description</i>	<i>Outline</i>
1E – Floral motifs – 2-stem papyrus	This type represents two papyrus plants flanking a central motif or stemming from spirals. Sometimes, two pairs of papyrus plants are represented on the sides of a central motif. This design can be shown twice, mirrored, or be associated with other hieroglyphs.	
1E – Floral motifs – 3-stem papyrus	This type displays three papyrus plants, one at the centre and one bending at each side. This design can be shown mirrored or be associated with other hieroglyphs.	
1E – Floral motifs – lotus flower	This type depicts a lotus flower, sometimes associated with a papyrus plants or with other hieroglyphs. This design can also be shown twice, mirrored.	
2A – Un-linked scrolls and spirals	This type shows one or multiple separate scrolls or spirals, which can be oriented vertically or horizontally. The extremities of the spirals and scrolls can be more rounded or more elongated, and can rolled in opposite directions, creating an S-shape, or towards each other. This design can be associated with other hieroglyphs.	
2B – Interlocking scrolls and spirals	This type portrays multiple scrolls and spirals, oriented vertically and horizontally and, sometimes, diagonally. The extremities of the spirals and scrolls are connected, can be more rounded or more elongated, and be rolled in opposite directions, creating an S-shape, or in towards each other. Not often, this design can be associated with other hieroglyphs.	
3A1 – sign of union	This type displays the sign of union of Lower and Upper Egypt (sma tawy), namely intertwined papyrus plants and lotus flowers. It can be associated with other hieroglyphs.	
3A2 – nbty design	This type depicts the nbty, namely two nb signs indicating Wadjet and Nekhbet, respectively the cobra goddess of Lower Egypt and the vulture goddess of Upper Egypt, showing the unity of Egypt. It can be represented vertically or horizontally and is usually associated with other hieroglyphs.	

(continued)








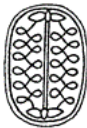


<i>Design type</i>	<i>Description</i>	<i>Outline</i>
3A3 – varia	This type combines different hieroglyphs, written one or more times, though, these are not used to create meaningful sentences. The hieroglyphs can be oriented vertically or, less often, horizontally.	
3A4 – Horus hawk	This type shows the signs for the Horus hawk, namely a sitting hawk seen from the side, combined with other hieroglyphs. This design can be oriented horizontally or vertically.	
3B1c var.1 – Cobras confronted on columns of hieroglyphs	This type represents two cobras facing each other, at the top of two columns of identical hieroglyphs. A third column of hieroglyphs can be written in the centre. This design is oriented vertically and can be combined with other designs of type 3B.	
3B1c var.2 – Cobras confronted with winged sun disk	This type portrays two cobras facing each other, with one or more hieroglyphs between them, above a winged sun disk. This design is combined with other hieroglyphs and other designs of type 3B and is oriented vertically.	
3B1c var.3 – Cobras confronted longitudinally	This type shows two cobras facing each other, with one or more hieroglyphs between them, oriented horizontally. This design is combined with other hieroglyphs and other designs of type 3B.	
3B2 – nsw-bft	This type shows the sedge plant and the bee, which form the title King of Lower and Upper Egypt. This design is combined with other hieroglyphs and is oriented vertically.	
3B3a – Red crowns ad-dorsed on nb	This type displays two red crowns with the back towards each other, each of them on a nb sign. This design can be oriented horizontally or vertically and is combined with other hieroglyphs and other designs of type 3B and, rarely, 1E, 2B, and 3A1.	
3B3b – Red crowns ad-dorsed	This type represents two red crowns with the back towards each other. This design can be oriented horizontally or vertically and is combined with other hieroglyphs and other designs of type 3B and, rarely, 2A and 6A.	

(continued)

<i>Design type</i>	<i>Description</i>	<i>Outline</i>
3B3c – Red crowns confronted	This type depicts two red crowns facing each other, which can be on nb sign or not. This design can be oriented horizontally or vertically and is combined with other hieroglyphs and other designs of type 3B and, rarely, 7B.	
3B3e – Red crowns tête bêche	This type portrays two red crowns, which can be on nb sign or not, in opposite directions. This design is oriented horizontally and is combined with other hieroglyphs and other designs of type 3B, 3C and, rarely, 2A.	
3B4 – Horus eyes	This type depicts two eyes of Horus, combined with other hieroglyphs and other designs of type 2A, 2B, 3B and, rarely, 1E and 8A. This design can be oriented horizontally or vertically.	
3B5 – Sedge plants	This type represents two sedge plants, facing each other or, less commonly, looking away from each other. This design can be oriented vertically or, less commonly, horizontally. It is combined with other hieroglyphs and other designs of type 3B and, rarely, 1E.	
3B6 – Gold sign longitudinal	This type displays the sign for gold, nwb, oriented horizontally or, rarely, vertically. This design is combined with other hieroglyphs and other designs of type 1E and 3B and, rarely, 7B.	
3B7 – Forepart of lions	This type shows twice the forepart of a recumbent lion. The two foreparts usually look away from each other, and rarely face each other, or are mirrored, or are oriented in opposite directions. This design can be oriented vertically and, less commonly, horizontally. It is combined with other hieroglyphs and other designs of type 3B and, more rarely, 1E, 7B and 8A.	
3C – Formulae	This type portrays Egyptian formulae, mostly related to the sun-god Ra. The formulae are usually written in a column, which can be oriented vertically or horizontally and can be flanked by other hieroglyphs. To this type belongs also the so-called anra type, which is typical of the Second Intermediate Period and takes its name from the hieroglyphs used to write it.	









(continued)

<i>Design type</i>	<i>Description</i>	<i>Outline</i>
3D1 – Cartouches simplified	This type represents an oblong ring enclosing a column of hieroglyphs, which can be flanked or encircled by other hieroglyphs. This design can be oriented vertically or horizontally, and is be combined with designs of type 3B, 6A, 7A and, rarely 4.	
3D2 – Actual cartouches	This type shows a real cartouche, flanked, or encircled by other hieroglyphs. This design can be oriented vertically or horizontally, and is be combined with designs of type 3B, 6A, 7A and, rarely 4.	
3E1 – Panels	This type displays three columns of hieroglyphs, each separated by one or two lines. This design is oriented vertically.	
3E2 – Panels with two signs in margins	This type depicts three sections, of which the outer ones have two hieroglyphs, and the middle one has a design of type 3C or 6C. This design is oriented vertically.	
3E4 – Panels with crossbars in margins	This type depicts three sections, of which the outer ones have horizontal lines, and the middle one has a design of type 3C or 6C. This design is oriented vertically.	
4 – Circles	This type portrays two to multiple circles, which can sometimes be combined with other signs or encircle a column of hieroglyphs, oriented vertically.	
5 – Crosses	This type represents crosses, usually made of a horizontal element, a vertical element crossing it and a coil in each of the corners formed by the cross. It can be combined with designs of type 2A.	
6A1 – Single line thread	This type displays a thread drawn with a single, continue line. It can be combined with other hieroglyphs or designs of type 2A, 2B and, less commonly, 1E and 3B. This design can be oriented vertically or horizontally.	









(continued)

<i>Design type</i>	<i>Description</i>	<i>Outline</i>
6A2 – Single line loops	This type shows separate loops, drawn with a single line and usually on multiple rows, which are sometimes mirrored. It can be oriented horizontally or vertically, and combined with designs of type 1E, 2A, 2B. This design can be oriented vertically or horizontally.	
6B1-2 – Convoluted coils	This type portrays coils and threads made of double lines. It can be oriented vertically or horizontally and can be combined, not commonly, with hieroglyphs and with designs of type 1E and 8A.	
6B3 – Convoluted coils, varia	This type depicts coils and threads made of double lines, departing from a central point but connected less homogeneously than in type 6B1-2. It can be oriented vertically or horizontally.	
6C1 – Encompassed coils with central x cross	This type shows coils and threads made of double lines, departing from a central point but connected less homogeneously than in type 6B1-2. It can be oriented vertically or horizontally.	
6C2 – Encompassed coils with central twist	This type represents coils and threads made of double lines, departing from a central horizontal or vertical line twisted in the middle.	
6C3 – Encompassed coils with central cable	This type portrays double-line coils and threads, departing from a central column made of twisted double-line threads. It can be oriented vertically or horizontally, and it is sometimes combined with hieroglyphs or designs of type 1E, 3B, 3C, and 3E4.	
7A1 – Continuous scroll border with round scrolls	This type displays a frame made of continuous, interlocking rounded coils. In the centre can be written loose hieroglyphs, cartouches and royal names, titles and names of officials and their family members and, rarely, designs of type A2. It is oriented vertically.	
7A2 – Continuous scroll border with oblong scrolls	This type depicts a frame made of continuous, interlocking elongated coils. In the centre can be written loose hieroglyphs, cartouches and royal names, non-royal titles and names and, rarely, designs of type 8A. It is oriented vertically.	

(continued)

<i>Design type</i>	<i>Description</i>	<i>Outline</i>
7B1 – Paired scroll, one pair	This type portrays a frame made of a continuous single line creating one coil at each of two opposite ends. In the centre can be written loose hieroglyphs, cartouches and royal names, non-royal titles and names and, rarely, designs of type 3B. It can be oriented vertically or horizontally.	
7B2 – Paired scroll, two pairs	This type represents a frame made of a continuous single line creating two interlocking coils on the long sides. In the centre can be written loose hieroglyphs, cartouches and royal names, and non-royal titles and names. It is oriented vertically.	
7B3 – Paired scroll, three pairs	This type shows a frame made of a continuous single line creating three interlocking coils on the long sides. In the centre can be written loose hieroglyphs, cartouches and royal names, and non-royal titles and names. It is oriented vertically.	
7B4 – Paired scroll, four or more pairs	This type displays a frame made of a continuous single line creating four or more interlocking coils on the long sides. In the centre can be written loose hieroglyphs, cartouches and royal names, and non-royal titles and names. It is oriented vertically.	
7C – paired scrolls, open	This type depicts a frame made of a single line, creating interlocking coils on the long sides and open on one or both short sides. The open ends are sometimes shaped like cobras or papyrus. In the centre can be written loose hieroglyphs, cartouches and royal names, and non-royal titles and names. It is oriented vertically.	
8A – Rope border with twisted strand	This type portrays a rope-like frame, which can be single or double. In the centre can be written loose hieroglyphs, cartouches and royal names, non-royal titles and names, and, more rarely, designs of type 1E, 3B, 6B, 6C, 10B. It can be oriented vertically or horizontally.	
8C – Rope border with full twisted cable	This type shows a frame made of a twisted multiple line. In the centre can be written loose hieroglyphs, cartouches and royal names, and non-royal titles and names. It is oriented vertically.	
9B – Antelopes	This type displays an antelope, sometimes combined with other designs of type 9 and 10. It is oriented horizontally.	

(continued)

<i>Design type</i>	<i>Description</i>	<i>Outline</i>
9C – Animals, cobras confronted	This type depicts two cobras facing each other. It is combined with hieroglyphs or other designs of type 3, 9 and 10 and can be oriented horizontally or vertically.	
9D – Animals, crocodiles	This type represents a crocodile. It is often combined with other designs of type 9 and 10 and can be oriented horizontally or vertically.	
9E – Animals, lions	This type portrays a lion. It is combined with hieroglyphs or other designs of type 9 and 10 and can be oriented horizontally or vertically.	
9F – Animals, heraldic beasts	This type depicts animals in heraldic poses, namely standing and with symbols of power. It is combined with hieroglyphs or other designs of type 9 and 10 and can be oriented horizontally or vertically.	
10A – Standing figure	This type shows a standing human figure, with human or animal head. Sometimes, royal figures or deities, such as Hapy, Ptah, or Hathor, are represented. The figure can be still or shown in actions such as holding symbols of life or power or walking or smiting an animal. The figure can be accompanied by an inscription or the background of the scene. This type can be combined with other designs of type 9. It can be oriented horizontally or vertically.	
10B – More figures	This type represents two standing human figures, with human or animal head and usually facing each other. This type can be combined with hieroglyphs and designs of type 3B, 7B, and 10D. It can be oriented horizontally or vertically.	
10C – Kneeling figure	This type displays a kneeling human figure, with human or animal head. It is combined with other hieroglyphs and designs of type 3B and 7B. This design can be oriented horizontally or vertically.	
10D1 – Standing goddess	This type depicts a standing female figure with the head commonly used to depict the goddess Hathor. It can be oriented horizontally or vertically.	

(continued)


<i>Design type</i>	<i>Description</i>	<i>Outline</i>
10D2 – Hathor symbol	This type represents only the head commonly used to depict the goddess Hathor. It is combined with hieroglyphs and with designs of type 1E, 2A, 2B, 3B, 10B. This design can be oriented vertically or horizontally.	

Table 3: Description and outline of the main types of scarab and seal designs. The designs are drawn after Ben-Tor 2007 and Mlinar 2001b.

## THE LATE MIDDLE KINGDOM

As far as the contexts with scarab and seal designs included in the analysis of the Late Middle Kingdom are concerned (Table 9 in Appendix I; Appendix VI), Harageh,<sup>40</sup> Qau el-Kebir,<sup>41</sup> Abydos,<sup>42</sup> Tell el-Dab'a,<sup>43</sup> and Esna<sup>44</sup> are the sites with the highest number of contexts, as well as with the greatest variety of types.<sup>45</sup> Common burials constitute the great majority of contexts for the scarab and seal designs of the Late Middle Kingdom, while royal burials included in the present analysis are found only in Dahshur,<sup>46</sup> Lahun,<sup>47</sup> Abydos,<sup>48</sup> though scarabs retrieved at these sites come also from non-royal burials.<sup>49</sup>

Settlement contexts of the Late Middle Kingdom with scarab and seal designs are found in Lisht,<sup>50</sup> Lahun,<sup>51</sup> and Elephantine.<sup>52</sup> These sites have also

40 Engelbach and Gunn 1923, 18–20 and pls. X, XX, LVIII–LXII.

41 Brunton, Gardiner, and Petrie 1930, 1–3 and pls. II, IV.

42 Ayrton et al. 1904, 18, 47, 53 and pls. XI, XXXIX; Ben-Tor 2007, 29–31; Garstang, Newberry, and Milte 1901, 44–46 and pls. I, X, XV, and XXV; Martin 1971; Peet 1914, 58; Peet and Loat 1913, 23–28 and pls. IV, VIII; Tooley 2015; Wegner 1996; Wegner 1998, figs. 17–19.

43 Bietak, Mlinar, and Schwab 1991, 36; Forstner-Müller 2008, 135–36; Mlinar 2001b, ns. 1–22; Schiestl 2009, 91–92.

44 Downes 1974, 56–66 and Tomb register.

45 For an overview of the scarab and seal impressions of the Late Middle Kingdom: Ben-Tor 2007, 10–41.

46 Ben-Tor 2004, figs. 2 and 6; Ben-Tor 2007, 30 and 33–37; De Morgan et al. 1895, 62, 69 and 109–10; Keel 1989, 285 and fig. 4; Martin 1971, n. 1601 and pl. 14.11; Newberry 1907, pl. 18 and ns. 37411, 37413; Oppenheim 1995, 10–11; Oppenheim 1996, 26; Tufnell, Martin, and Ward 1984, pl. 52 n. 3065.

47 Ben-Tor 2007, 10–37; Tufnell, Martin, and Ward 1984, pl. 53; Winlock 1934, 55–56.

48 Wegner 1996.

49 Ayrton et al. 1904, 18, 47, 53 and pls. XI, XXXIX; Baba and Yazawa 2015; Ben-Tor 2007, 10–37; Tufnell, Martin, and Ward 1984, pl. 53.

50 Ben-Tor 2007, 13–40; Hayes 1953, 191 and fig. 226; Lansing 1924, 41; Martin 1971.

51 Ben-Tor 2007, 10–37; Martin 1971; Petrie, Brunton, and Murray 1923, 26–34, pls. XLVIII and LXIII–LXV; Petrie, Griffith, and Newberry 1890, 29, pl. X; Petrie et al. 1891, 14, pls. VI–II–X; Tufnell 1975, figs. 2–12; Tufnell, Martin, and Ward 1984, pl. 53; Winlock 1934, 55–56.

52 Ben-Tor 2007, 10–35; Tufnell 1975, fig. 3; Von Pilgrim 1996, figs. 98–104.



a great variety of types. Furthermore, a settlement context comes from the Theban area.<sup>53</sup> Other sites included in the present analysis are Denderah,<sup>54</sup> Riqqeh,<sup>55</sup> Matmar,<sup>56</sup> Mostagedda,<sup>57</sup> Hu,<sup>58</sup> Edfu,<sup>59</sup> Ballas,<sup>60</sup> and Nubt.<sup>61</sup> This latter has also yielded a great variety of types, though the number of contexts where they were found is not known. However, it has been included in the analysis because the type and dating of the contexts is mentioned by the excavator.<sup>62</sup>

As far as the types of scarab and seal designs during the Late Middle Kingdom are concerned, the most common designs include interlocking scrolls and spirals, or combinations of various hieroglyphs (Types 2A, 2B, 3A3). Other common designs include floral patterns, unlinked scrolls and spirals, and borders with paired scrolls (Types 1E, 6A2, 7B3). Designs that are slightly less common include the sign of union, the *nbtj* design, the cobras, the eyes of Horus, sedge plants, formulae, cartouches, circles, crosses, single line loops, convoluted coils of various shapes, continuous scrolls borders, rope borders, as well as animal and anthropomorphic representations (Types 3A1, 3A2, 3B1, 3B4, 3B5, 3C, 3D, 4, 5, 6A2, 6B1-2, 6B3, 7A1, 7A2, 8A, 9, 10). Other designs, which are also found but are not common, include the Horus hawk, the *nsw-bit*, red crowns, the gold sign, forepart of lions, panels with cross-bars in margins, single line threads, open borders with paired scrolls, and borders with twisted cable (Types 3A4, 3B2, 3B3a, 3B3b, 3B3c, 3B3e, 3B6, 3B7, 3E4, 6A1, 7B1, 7B4, 7C, 8C).

Regarding the scarabs themselves, during the Late Middle Kingdom they are made mostly of steatite and faience, but other materials are used as well. These materials include mostly amethyst and, on a lesser scale, carnelian, feldspar, lapis lazuli, turquoise, jasper, and obsidian. Sometimes gold and silver are used as well in the production of scarabs, to manufacture the rings where they were mounted.

53 Anthes 1943, 10; Loyrette, Nasr, and Bassiouni 1994, 116–18; Martin 1971; Millet 2007.

54 Petrie and Griffith 1900, 25–26 and pl. XX.

55 Engelbach et al. 1915, pl. XVII.

56 Brunton 1948, 54–56 and pl. XLIII.

57 Brunton and Morant 1937, 113–14 and pls. LXVIII–LXIX.

58 Ben-Tor 2007, 36–37; Bourriau 2009, 59, 61, 63, and 81; Petrie and Mace 1901, 43–44 and pl. XLI.

59 Michałowski et al. 1939, 31–33; Michałowski et al. 1950, 184 and pl. XLIV.13.

60 Martin 1971; Petrie, Quibell, and Spurrell 1896, 44 and pl. LVIII.

61 Ben-Tor 2007, 10–31 and 78–97; Martin 1971; Petrie, Quibell, and Spurrell 1896, 65–67 and pls. LXXX–LXXXI.

62 Petrie, Quibell, and Spurrell 1896, 65–67.



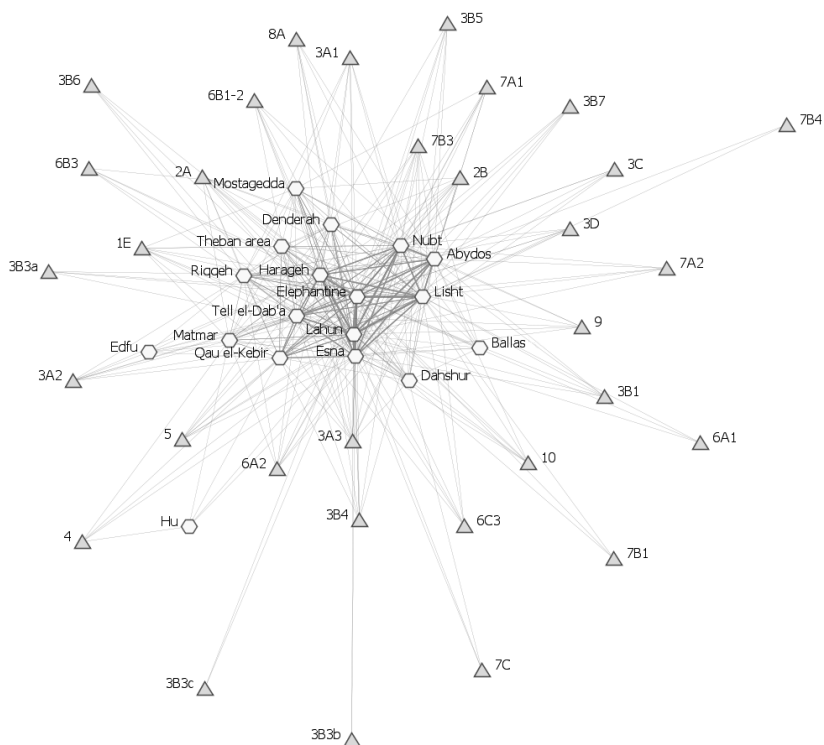


Figure 55: Contexts of the Late Middle Kingdom and the most common scarab and seal designs.

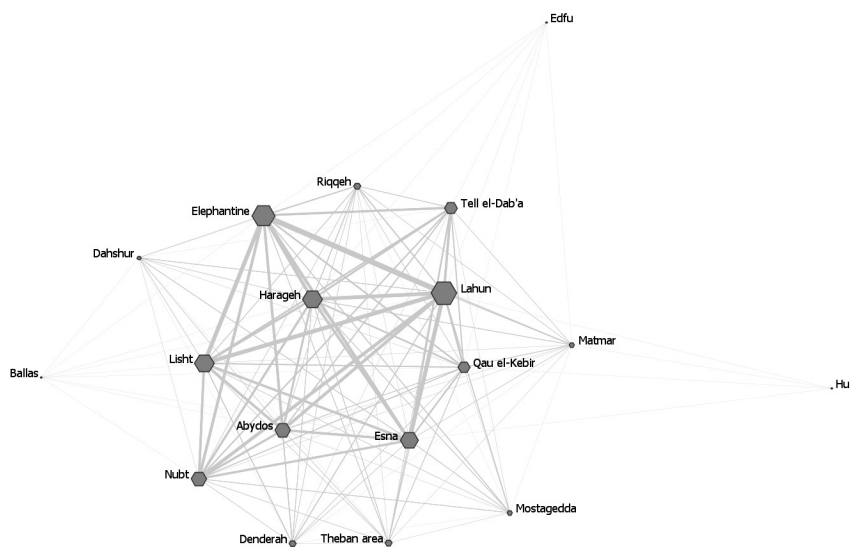


Figure 56: Degree centrality of the first one-mode graph of the scarab and seal designs during the LMK.

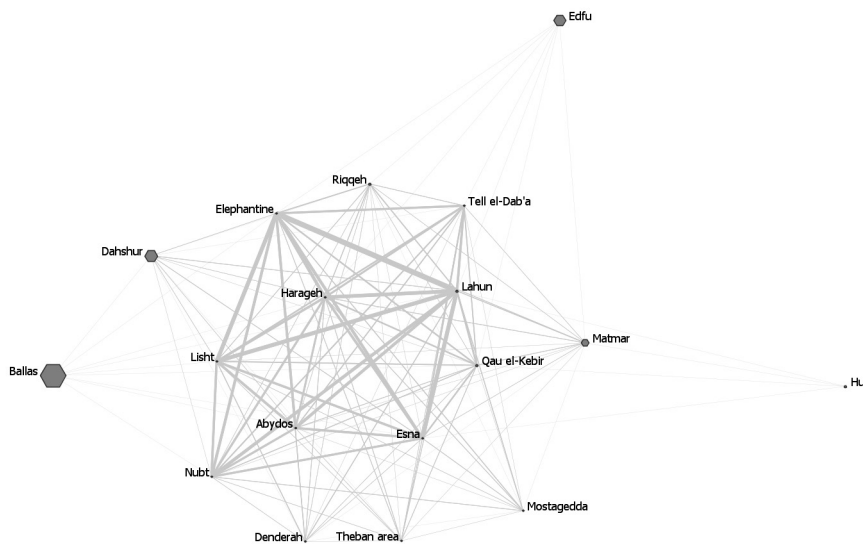


Figure 57: Betweenness centrality of the first one-mode graph of the scarab and seal designs during the LMK.

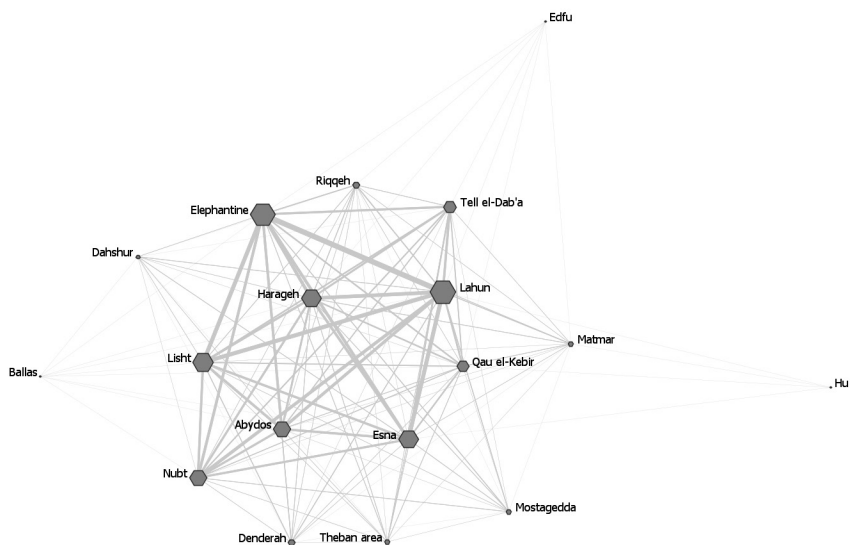


Figure 58: Eigenvector centrality of the first one-mode graph of the scarab and seal designs during the LMK.

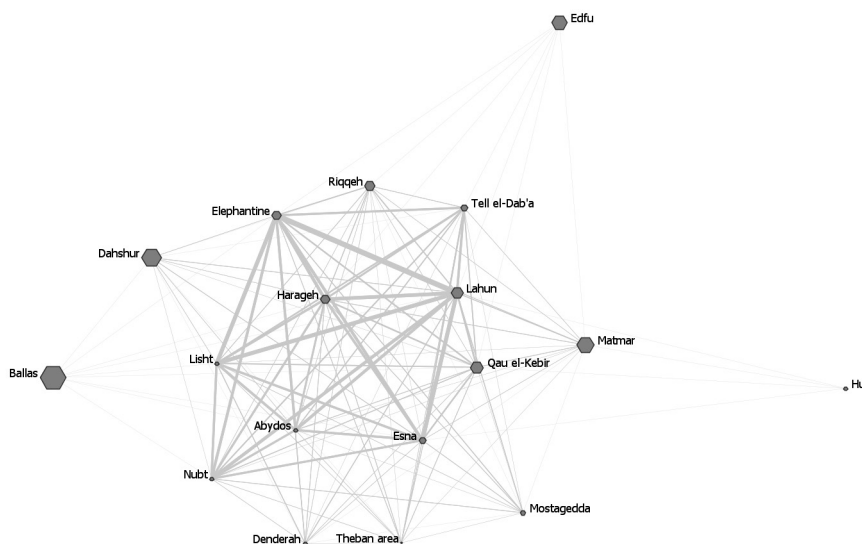


Figure 59: Closeness centrality of the first one-mode graph of the scarab and seal designs during the LMK.

### *The first one-mode graph*

In the network created by the shared designs of scarab and seal designs (Figures 56–59) all the sites are connected, meaning that they all share at least one type of design. This implies that these sites are the ones that share the higher amount of designs with the other sites. Nevertheless, the stronger connections are between the sites in the Memphis-Fayyum area and southern Upper Egypt.

As far as the centrality measures are concerned (Tables 27, 40, 53, 66 in Appendix II), Lisht, Lahun, Harageh, Esna, Nubt, and Elephantine have a high or very high rank for both the degree and the eigenvector centrality, implying that they were the better-connected sites, with many strong connections of good quality. Tell el-Dab'a, Qau el-Kebir, and Abydos have a similar pattern, but score mostly in the middle rank, suggesting a less prominent role based on the data collected.

Ballas has high or very high betweenness and closeness centrality, while Dahshur and Edfu score mostly in the middle rank. This shows that they were intermediaries in the network of scarab and seal designs, with Ballas the most prominent site in this role. Riqqeh, Matmar, Mostagedda, Hu, Denderah, and the Theban area score in the lowest ranks, meaning that the area does not create strong connections in the network, based on the available data. Only

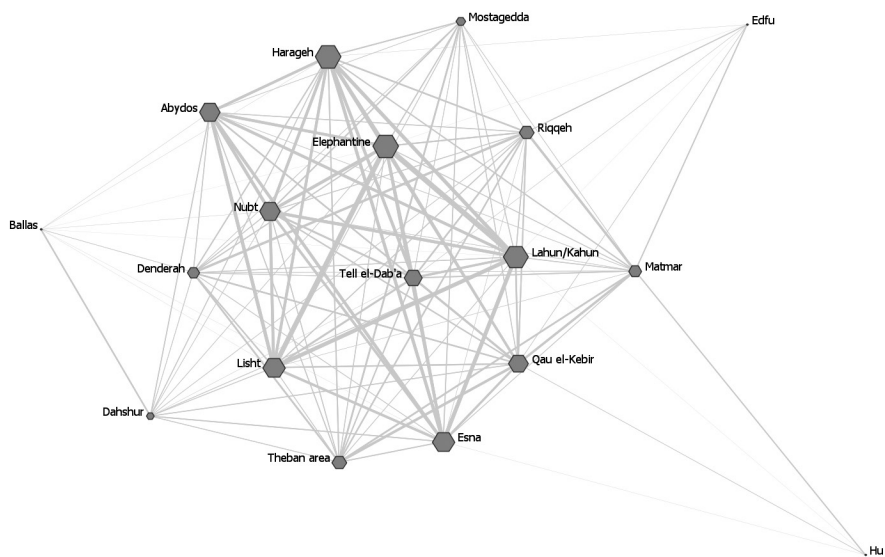


Figure 60: Degree centrality of the second one-mode graph of the scarab and seal designs during the LMK.

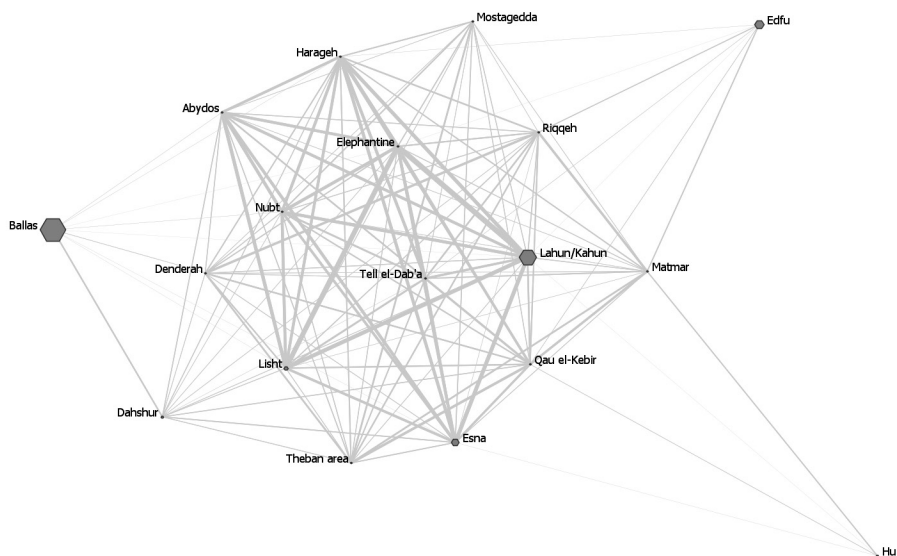


Figure 61: Betweenness centrality of the second one-mode graph of the scarab and seal designs during the LMK.

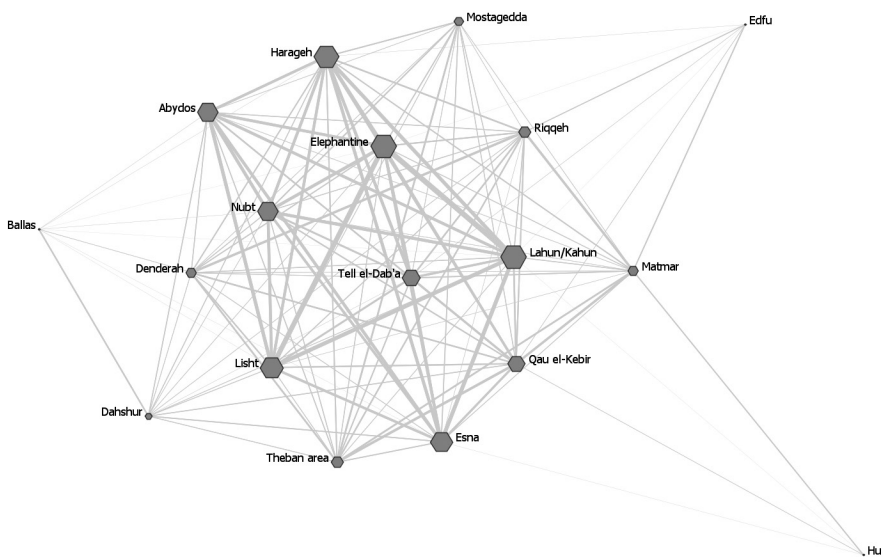


Figure 62: Eigenvector centrality of the second one-mode graph of the scarab and seal designs during the LMK.

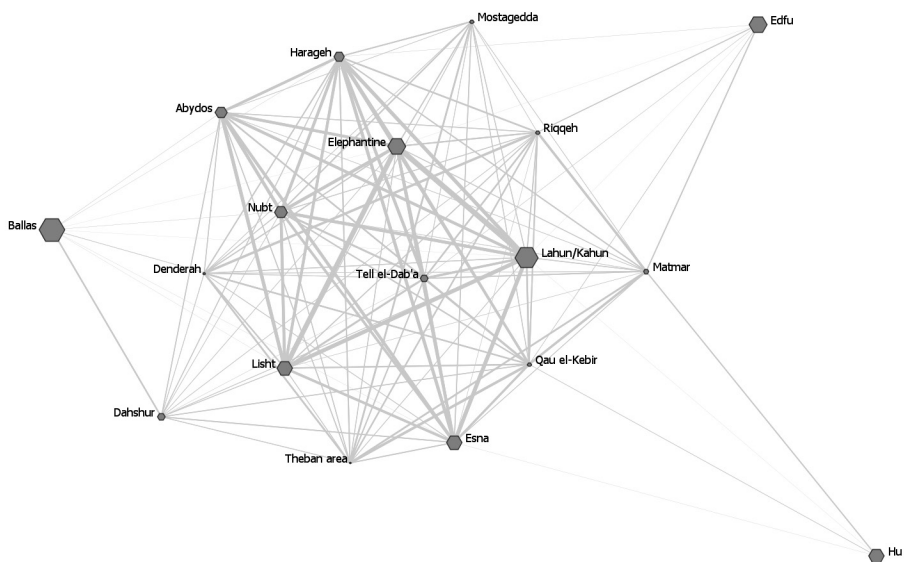


Figure 63: Closeness centrality of the second one-mode graph of the scarab and seal designs during the LMK.

Matmar has a high closeness centrality, meaning it was more easily accessible than the other sites in the network.

### *The one-mode graph based on the Jaccard similarity*

The structure detected in the second one-mode graph (Figures 60–63), created through the Jaccard algorithm applied to the full range of designs, has the same shape as the one-mode graph, meaning that its structure is reliable. From the analysis of the centrality measures (Tables 79, 92, 105, 118 in Appendix III), it appears that Lisht, Lahun, Harageh, Esna, Nubt, and Elephantine have similar scores in both one-mode graphs. In other words, they score in the high or very high rank for both the degree centrality and the eigenvector centrality, thus they are still the better-connected sites.

It can be noticed that Lahun and Lisht scores in the higher ranks for all the measures, thus it looks more important in the second graph. In addition, the closeness centrality is generally in higher ranks than in the first graph, therefore the sites appear more easily reachable through the connections established in the network. The described small differences derive from the proportion of common and not common types that form the range of scarab and seal designs shared by the sites. Mostagedda and Hu keep a similar pattern in both networks too, scoring mostly in the lower ranks. However, Hu has a high closeness centrality, which means that, when the whole range of scarab and seal designs is considered, it is more easily reachable than Mostagedda.

At the same time, Ballas scores very high for the betweenness and closeness centrality in both graphs, meaning that it still appears like a main intermediary in the network of scarab and seal designs. Tell el-Dab'a, Qau el-Kebir, and Abydos are also among the better-connected sites in the second graph, scoring high degree and eigenvector centrality. Therefore, they keep a similar pattern in both graphs, but they appear more important when their full range of designs is considered. Riqqeh, Matmar, Denderah, and the Theban area also appear more important when their full range of scarab and seal designs is analysed, because in the second graph they score in the middle rank for the degree and eigenvector centrality. This situation derives from the fact that all these sites, although they have a large part of their range of scarab and seal designs in common, do not share many of the common types. Consequently, they appear less important when only the shared types are examined, while they acquire more importance when the full range of types are analysed.

Lastly, Dahshur and Edfu score mostly in the lower ranks, looking less important when the full range of scarab and seal designs are considered. The only exception is the closeness centrality of Edfu, which is in the high rank. However, the mostly low scores detected for Dahshur and Edfu originate from the fact that these sites do not have a large part of their range in common, but

this part includes mostly common types, so that they acquire more importance when only the shared types are examined, because these types shape the results of the first one-mode graph.

### *Summary*

The major players in the network, created by the designs on scarabs and seals, during the Late Middle Kingdom are Lisht, Lahun, Harageh, Esna, Nubt, and Elephantine. This implies that these sites could be the starting or ending points of the flow of communications in the network and had the strength of spreading new trends because they created many connections through their material culture.<sup>63</sup> Ballas seems to be an intermediary, thus, to play the role of a passageway or (re)distribution centre in the network of scarab and seal designs, namely the place where the objects would pass by or be redistributed from.<sup>64</sup>

At the same time, Tell el-Dab'a, Abydos and Qau el-Kebir appear among the better-connected sites of the network only when their full range of designs is considered, because they share several types of scarab and seal designs with the other sites, but not many of the most common ones. The contrary is true for Dahshur and Edfu, which seem more important only when the shared types are considered. This comes from the fact that these sites only share a small part of their scarab and seal designs, but this part is largely made of the most common types.

## THE EARLY SECOND INTERMEDIATE PERIOD

For the Early Second Intermediate Period (Table 15 in Appendix I; Appendix VII) only few contexts with scarab and seal designs, from four sites, are included in the analysis.<sup>65</sup> Of these sites, only Ain Asil<sup>66</sup> is not found also in the analysis of the Late Middle Kingdom, while the others, namely Tell el-Dab'a,<sup>67</sup> Qau el-Kebir,<sup>68</sup> and Abydos<sup>69</sup> are included also in the analysis of the Late Middle Kingdom. More than half of these contexts comes from Tell el-Dab'a,<sup>70</sup>

63 Östborn and Gerding 2015.

64 Gjesfjeld 2015; Rivers, Knappett, and Evans 2013.

65 For an overview of scarab and seal impressions during the Second Intermediate Period: Ben-Tor 2007, 72–113.

66 Marchand, Soukiasian, and Bourriau 2010, 305–7.

67 Ben-Tor 2007, 89; Bietak, Mlinar, and Schwab 1991, 46–89; Forstner-Müller 2008, 143–90; Mlinar 2001b, ns. 201–307.

68 Brunton, Gardiner, and Petrie 1930, 3–13, pls. V–VIII and XIX.

69 Garstang, Newberry, and Milte 1901, 44–46 and pl. X; Martin 1971; Peet 1914, 57–58 and pl. XIII; Randall-MacIver, Mace, and Griffith 1902, 101 and pl. LIII.

70 Ben-Tor 2007, 89; Bietak, Mlinar, and Schwab 1991, 46–89; Forstner-Müller 2008,

and are all burials. The second site with the higher number of contexts with scarab and seal designs is Abydos.<sup>71</sup> Both Tell el-Dab'a<sup>72</sup> and Abydos<sup>73</sup> are the sites with the greatest variety of types. The two remaining sites are Qau el-Kebir<sup>74</sup> and Ain Asil,<sup>75</sup> where scarab and seal designs respectively come from burial and settlement contexts.

Concerning the types of scarab and seal designs during the Early Second Intermediate Period, these include floral patterns, linked and unlinked scrolls and patterns, the sign of union, the nbty sign, cobras, the *nsw-bit*, red crowns addorsed, formulae, circles, crosses, single line threads and loops, borders with paired scrolls, antelopes, and standing anthropomorphic figures (Types 1E, 2A, 2B, 3A1, 3A2, 3A3, 3B1, 3B3b, 3C, 4, 5, 6A1, 6A2, 7B1, 7B3, 9B, 10A). Of these designs, only the *nsw-bit* is not found in the types analysed for the Late Middle Kingdom.

The materials used to make the actual scarabs include, like in the Late Middle Kingdom, steatite and faience, as well as, very rarely, amethyst and rock crystal. Designs from scarabs and seals come from more tombs dated to the Second Intermediate Period in Abydos<sup>76</sup> and Qau el-Kebir.<sup>77</sup> and Esna.<sup>78</sup> Nevertheless, they could not be included in the analysis because their contexts have not been precisely dated to the Early or to the Late Second Intermediate Period. The types found among these designs are the same as seen in the dated tombs, with the exception of type 3E2, which is found only in one tomb in Esna.<sup>79</sup> Furthermore, scarabs of amethyst, carnelian, and jasper are found in Abydos.<sup>80</sup>

### *Contacts in the Early Second Intermediate Period*

Only Tell el-Dab'a and Abydos are connected in the network of this phase, because they share several design types in the analysis of the Early Second

143–90; Mlinar 2001b, ns. 201–307.

71 Garstang, Newberry, and Milte 1901, pl. X; Martin 1971; Peet 1914, 57–58 and pl. XIII; Randall-MacIver, Mace, and Griffith 1902, 101 and pl. LIII.

72 Ben-Tor 2007, 89; Bietak, Mlinar, and Schwab 1991, 46–89; Forstner-Müller 2008, 143–90; Mlinar 2001b, ns. 201–307.

73 Garstang, Newberry, and Milte 1901, 44–46 and pl. X; Martin 1971; Peet 1914, 57–58 and pl. XIII; Randall-MacIver, Mace, and Griffith 1902, 101 and pl. LIII.

74 Brunton, Gardiner, and Petrie 1930, 3–13, pls. V–VIII and XIX.

75 Marchand, Soukiasian, and Bourriau 2010, 305–7.

76 Garstang, Newberry, and Milte 1901, pl. X; Peet 1914, 57–64; Randall-MacIver, Mace, and Griffith 1902, 67 and 97–101.

77 Brunton, Gardiner, and Petrie 1930, 3–13, pls. V–VIII and XIX.

78 Downes 1974, 56–66 and tomb register.

79 Ben-Tor 2007, 86–87; Downes 1974, 62.

80 Peet 1914, 57–64.



Intermediate Period (Figure 65). On the contrary, Qau el-Kebir and Ain Asil do not have any type of design in common with the other sites. Nevertheless, considering the small size of the sample analysed, the possibility of further contacts, which cannot yet be detected, also between other sites cannot be excluded.

So far, it can only be said that the available data suggest contacts between Tell el-Dab'a and Abydos during the Early Second Intermediate Period, already shown by the analysis of other materials.

## THE LATE SECOND INTERMEDIATE PERIOD

Of the sites with scarab and seal designs included in the analysis of this period (Table 9 in Appendix I; Appendix VIII),<sup>81</sup> Tell el-Dab'a,<sup>82</sup> Qau el-Kebir,<sup>83</sup> and Abydos<sup>84</sup> are included also in the analysis of all the periods studied in the present work. Other sites, namely Matmar,<sup>85</sup> Mostagedda,<sup>86</sup> Hu,<sup>87</sup> and the Theban area<sup>88</sup> are examined in the analysis not only of the Late Second Intermediate Period, but also of the Late Middle Kingdom. Moreover, Ain Asil<sup>89</sup> is in the analysis of both the Early and the Late Second Intermediate Period. Lastly, the sites of Tell el-Maskhuta,<sup>90</sup> Tell el-Retaba,<sup>91</sup> Sedment,<sup>92</sup> Deir el-Ballas,<sup>93</sup> and Tell Hebua<sup>94</sup> are found only in the analysis of the Late Second Intermediate Period.

81 For an overview of scarab and seal impressions during the Second Intermediate Period: Ben-Tor 2007, 72–113.

82 Ben-Tor 2007, 72–113; Bietak, Mlinar, and Schwab 1991, 134–247; Forstner-Müller 2008, 220–371; Hein, Jánosi, and Kopetzky 2004, 62–199, 339–52; Mlinar 2001b, ns. 401–914.

83 Ben-Tor 2007, 31–33 and 74–95; Brunton, Gardiner, and Petrie 1930, 3–13, pls. V–VIII and XIX; Keel 1989, 283 and fig. 5; Martin 1971.

84 Ayrton et al. 1904, 100 and pl. LIII; Garstang, Newberry, and Milte 1901, 44–46 and pl. X.

85 Brunton 1948, 56–58 and pls. XLIII–XLIV.

86 Ben-Tor 2007, 28–29 and 72–100; Brunton and Morant 1937, 114–22 and pl. LXIX.

87 Ben-Tor 2007, 72–93; Bourriau 2009, 76–77, 82, 85–86; Petrie and Mace 1901, 51–53 and pl. XLI.

88 Ben-Tor 2007, 111; Martin 1971; Miniaci 2011; Miniaci and Quirke 2009, 356; Petrie and Walker 1909, 9 and pl. 29; Tufnell, Martin, and Ward 1984, pl. 63; Winlock 1924.

89 Marchand, Soukiasian, and Bourriau 2010, 305–7.

90 Ben-Tor 2007, 74–102; Holladay Jr. 1982, 45; Holladay Jr. 1997, fig. 7.9; Redmount 1989, 903–55.

91 Rzepka et al. 2014, 39–46.

92 Petrie and Brunton 1924, 16–20, pls. XLIII and XLVI–XLVII.

93 Bourriau 1990, 24.

94 Maksoud 1998, 255–60.

The sites with the highest number of contexts with scarab and seal design during the Late Second Intermediate Period are Tell el-Dab'a,<sup>95</sup> like in the Early Second Intermediate Period, and Mostagedda,<sup>96</sup> followed by Sedment,<sup>97</sup> and Qau el-Kebir.<sup>98</sup> These contexts come from tombs, with only Tell el-Dab'a<sup>99</sup> contributing contexts from settlement among these sites. All the mentioned sites, as well as Tell el-Yahudiyah,<sup>100</sup> Tell el-Maskhuta,<sup>101</sup> and Rifeh,<sup>102</sup> are also the ones where a greater variety of types is found. Settlement contexts with scarab and seal designs have been excavated not only in Tell el-Dab'a,<sup>103</sup> but also in Rifeh,<sup>104</sup> Deir el-Ballas,<sup>105</sup> and Ain Asil.<sup>106</sup> Moreover, Tell Hebua,<sup>107</sup> Tell el-Maskhuta,<sup>108</sup> Tell el-Yahudiyah<sup>109</sup> have contributed both burial and settlement contexts. However, burials form the majority of contexts with scarab and seal designs.

Regarding the types of scarab and seal designs found in the Late Second Intermediate Period, visible in Figure 66, the most common ones include scrolls and spirals, various hieroglyphs combined, sedge plants, formulae, circles, and borders with paired scrolls (Types 2B, 3A3, 3B5, 3C, 4, 7B). Common, but on a lesser scale, designs are the floral designs with papyrus, the Horus hawk, cobras, red crowns, the gold sign, crosses, single line loops, con-

- 95 Ben-Tor 2007, 72–113; Bietak, Mlinar, and Schwab 1991, 134–247; Forstner-Müller 2008, 220–371; Hein, Jánosi, and Kopetzky 2004, 62–199 and 339–52; Mlinar 2001b, ns. 401–914.
- 96 Ben-Tor 2007, 28–29 and 72–100; Brunton and Morant 1937, 114–22 and pl. LXIX.
- 97 Petrie and Brunton 1924, 16–20, pls. XLIII and XLVI–XLVII.
- 98 Ben-Tor 2007, 31–33 and 74–95; Brunton, Gardiner, and Petrie 1930, 3–13, pls. V–VIII and XIX; Keel 1989, 283; Martin 1971.
- 99 Ben-Tor 2007, 72–113; Bietak, Mlinar, and Schwab 1991, 134–247; Mlinar 2001b, ns. 401–914.
- 100 Adam 1958, 305–6; Ben-Tor 2007, 72–106; Griffith 1890, 38–40 and pl. X; Martin 1971; Petrie and Duncan 1906, 10–15 and pls. VI–IX; Tufnell 1978, fig. 2; Tufnell, Martin, and Ward 1984, pl. 56.
- 101 Ben-Tor 2007, 74–102; Holladay Jr. 1982, 45; Holladay Jr. 1997, fig. 7.9; Redmount 1989, 903–55.
- 102 Petrie, Thompson, and Crum 1907, 20–21 and pl. XXIII.
- 103 Ben-Tor 2007, 72–113; Bietak, Mlinar, and Schwab 1991, 134–247; Forstner-Müller 2008, 220–371; Hein, Jánosi, and Kopetzky 2004, 62–199 and 339–52; Mlinar 2001b, ns. 401–914.
- 104 Petrie, Thompson, and Crum 1907, 20–21 and pl. XXIII.
- 105 Bourriau 1990, 24.
- 106 Marchand, Soukiassian, and Bourriau 2010, 305–7.
- 107 Maksoud 1998, 255–60.
- 108 Ben-Tor 2007, 74–102; Holladay Jr. 1982, 45; Holladay Jr. 1997, fig. 7.9; Redmount 1989, 903–55.
- 109 Adam 1958, 305–6; Ben-Tor 2007, 72–106; Griffith 1890, 38–40 and pl. X; Martin 1971; Petrie and Duncan 1906, 10–15 and pls. VI–IX; Tufnell 1978, fig. 2; Tufnell, Martin, and Ward 1984, pl. 56.

voluted coils of various shapes, open borders with paired scrolls, borders with twisted rope, heraldic beasts, standing anthropomorphic figures, the Hathor symbol (Types 1E, 3A4, 3B1, 3B3b, 3B3c, 3B3E, 3B6, 5, 6A2, 6B1-2, 7B, 8A, 9C, 9F, 10A, 10D2). Less common designs include floral designs with lotus flower, the sign of union, the Horus eyes, cartouches, coils with central coil or twist, continuous scrolls borders, rope borders, crocodiles, antelopes (Types 3A1, 3B4, 3D1, 3E4, 6C2, 6C3, 7A, 9B). The least common designs are the unlinked scrolls and spirals, *nsw-bit*, hieroglyphs divided into panels, borders with twisted cables, lions, various anthropomorphic figures, the standing Hathor-like figure (Types 2A, 3B2, 3E1, 8C, 9E, 10B, 10D1).

Of these designs, floral patterns, linked and unlinked scrolls and spirals, the sign of union, various hieroglyphs combined, cobras, the *nsw-bit*, red crowns, formulae, crosses, borders with paired scrolls, and animal and anthropomorphic figures (Types 2A, 2B, 3A1, 3A3, 3B1, 3B2, 3B3, 3C, 5, 7B, 9, 10), are found in all the periods examined. The Horus hawk, the Horus eyes, sedge plants, the gold sign, cartouches, circles, single line loops, convoluted coils, continuous scrolls borders, open borders with paired scrolls, and rope borders are included in the analysis not only of the Late Second Intermediate Period, but also of the Late Middle Kingdom (Types 3A4, 3B4, 3B5, 3B6, 3D, 4, 6A, 6B, 6C, 7A, 7C, 8A, 8C).

Concerning the materials used to produce the scarabs, they are mostly faience and steatite, like in the previous two periods examined. Scarabs and seals of the Late Second Intermediate Period are also made of amethyst, which is found in both previous periods, as well as, more rarely, carnelian and jasper, which are found also in the Late Middle Kingdom.

### *The first one-mode graph*

The first one-mode graph (Figures 67–70), detected through the designs of scarab and seal designs shared, shows that all the sites are connected, meaning that they share at least one type of design. Contacts are mostly between the sites in the Delta, namely Tell el-Dab'a, Tell el-Maskhuta, and Tell el-Yahudiyah, and the sites in Middle Egypt, especially Rifeh, Mostagedda, and Qau el-Kebir. At the same time, the connections between the sites in Lower Egypt and the sites in both Middle and southern Upper Egypt appear to pass through Sedment, mostly, and Ain Asil.

The analysis of the centrality measures (Tables 34, 47, 60, 73 in Appendix II) reveals that Tell el-Dab'a, Tell el-Yahudiyah, and Sedment are among the major players in the network. They score in the high or very high ranks for the degree and the eigenvector centrality, meaning that they have the higher amount of and the better connections: they are the better-connected sites. Also Tell el-Maskhuta, Rifeh, Mostagedda, and Qau el-Kebir show a similar

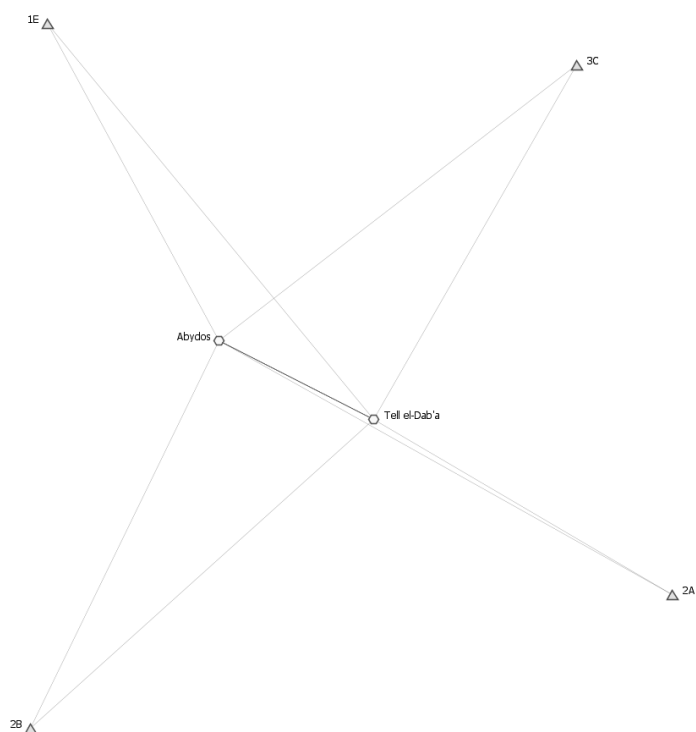


Figure 64: Contexts of the Early Second Intermediate Period and the most common scarab and seal designs.



Figure 65: First one-mode graph of the scarab and seal designs during the ESIP.



Figure 66: Contexts of the Late Second Intermediate Period and the most common scarab and seal designs.

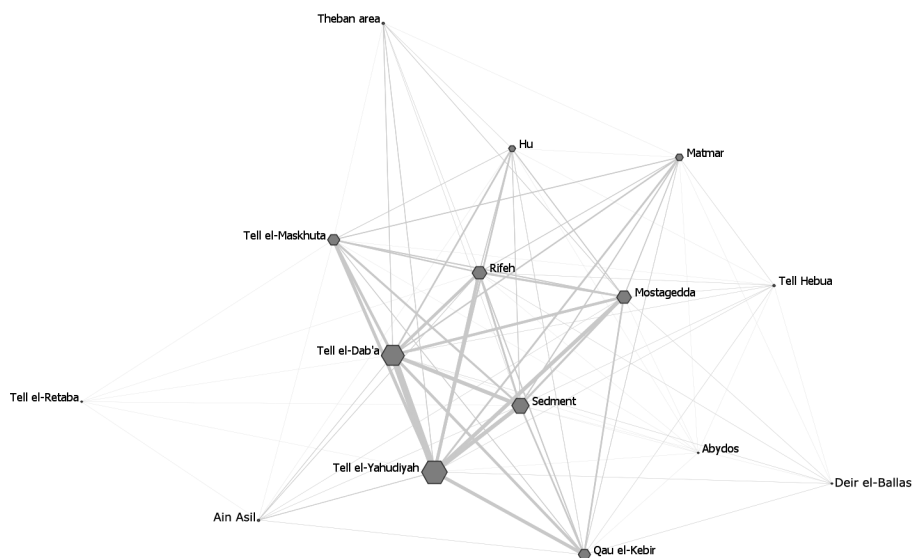


Figure 67: Degree centrality of the first one-mode graph of the scarab and seal designs during the LSIP.

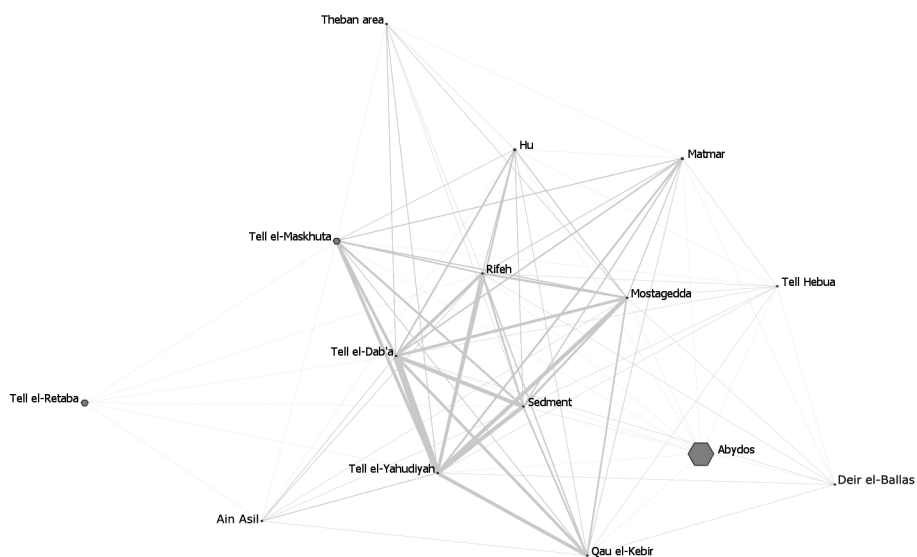


Figure 68: Betweenness centrality of the first one-mode graph of the scarab and seal designs during the LSIP.

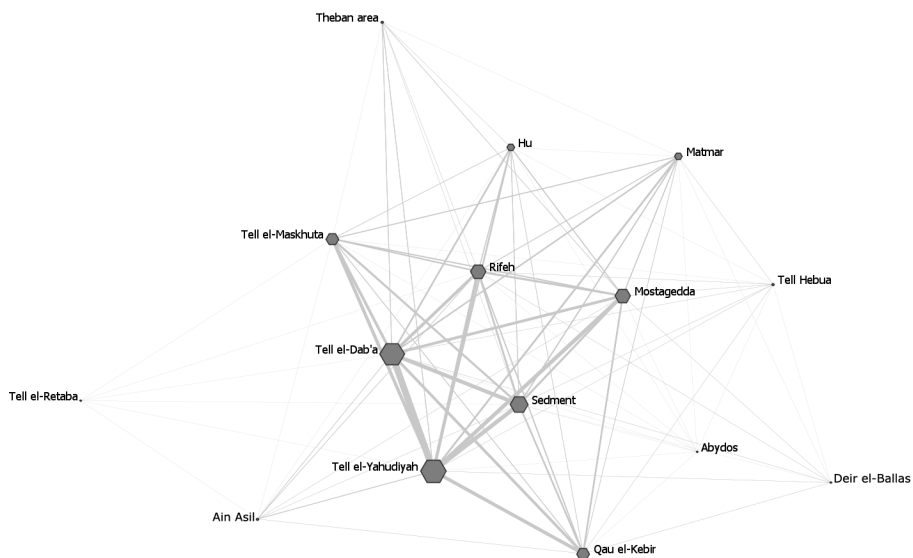


Figure 69: Eigenvector centrality of the first one-mode graph of the scarab and seal designs during the LSIP.

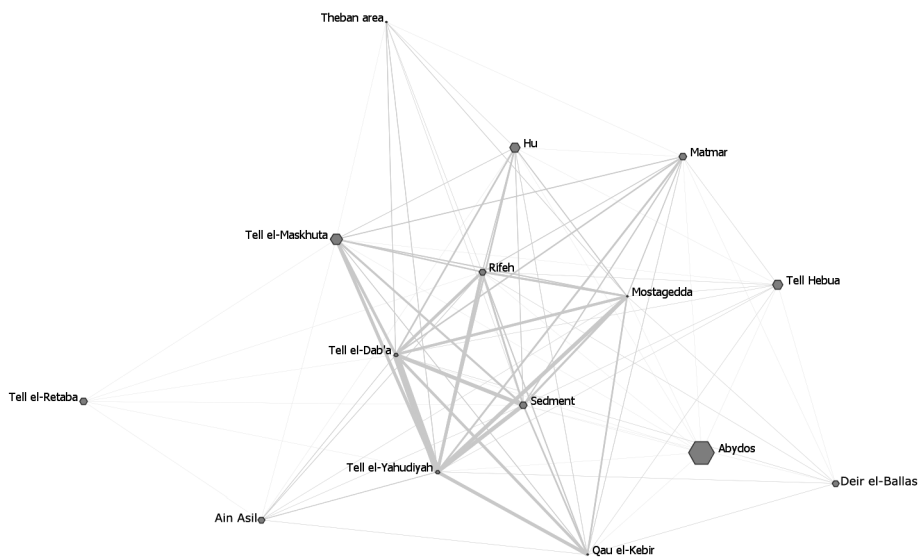


Figure 70: Closeness centrality of the first one-mode graph of the scarab and seal designs during the LSIP.

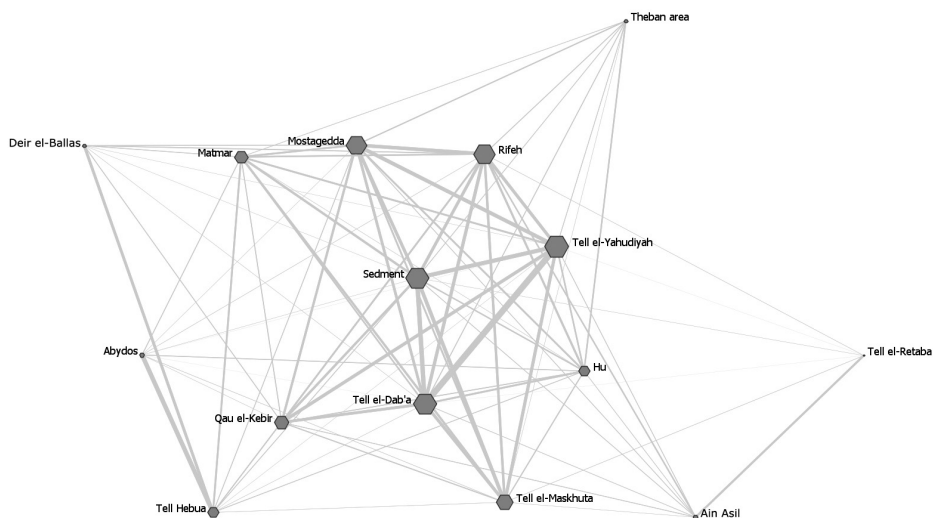


Figure 71: Degree centrality of the second one-mode graph of the scarab and seal designs during the LSIP.

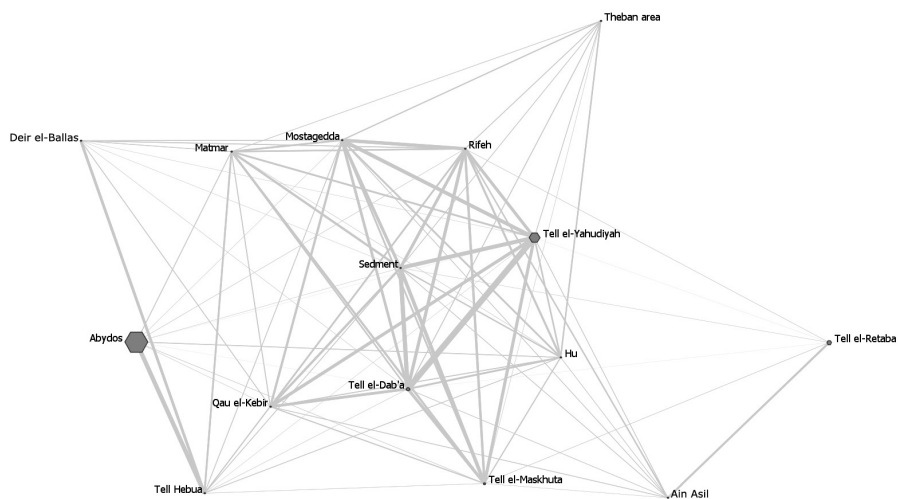


Figure 72: Betweenness centrality of the second one-mode graph of the scarab and seal designs during the LSIP.

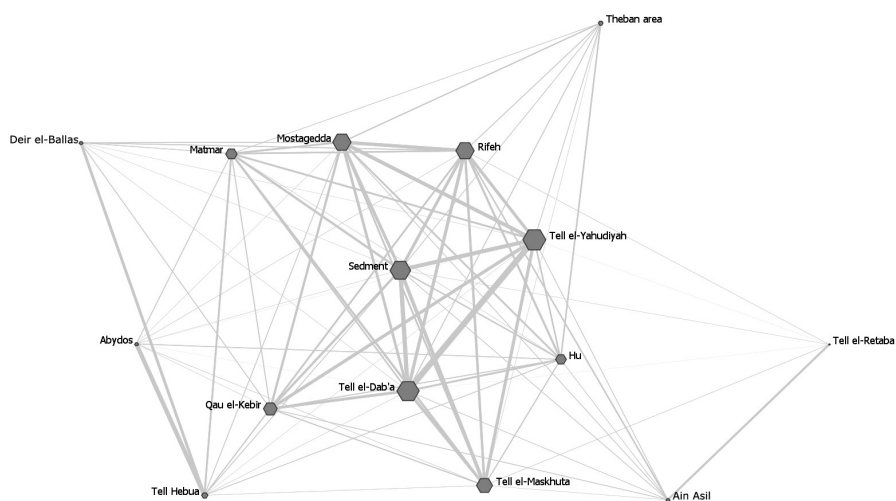


Figure 73: Eigenvector centrality of the second one-mode graph of the scarab and seal designs during the LSIP.



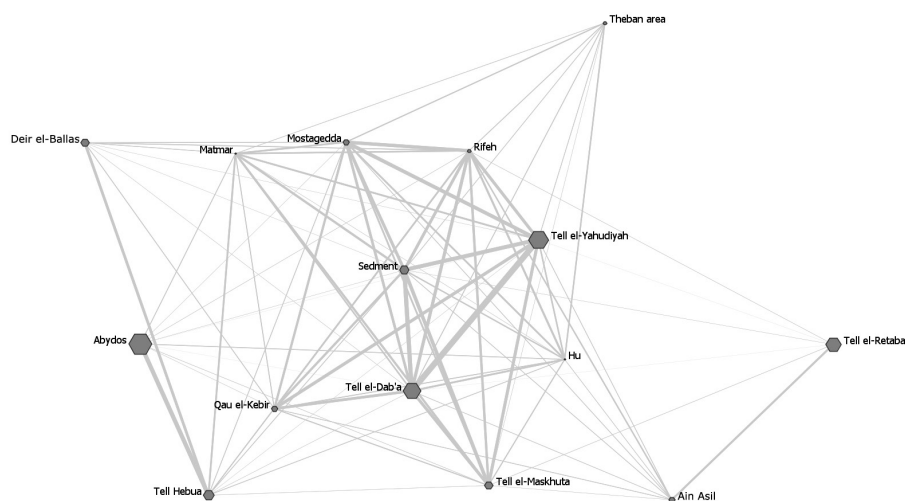


Figure 74: Closeness centrality of the second one-mode graph of the scarab and seal designs during the LSIP.

pattern, but they score in the middle range, which suggests that they were well connected, but not among the major players in the network. At the same time, Abydos has a very high betweenness and closeness centrality, suggesting its role as intermediary in the network of scarab and seal designs.

Lastly, Tell el-Retaba, Matmar, Hu, the Theban area, Deir el-Ballas, Tell Hebua, and Ain Asil score in the low or very low rank for all the measures, indicating that they create no strong connections in the network, on the basis of the data collected.

#### *The one-mode graph based on the Jaccard similarity*

The structure of the network based on the Jaccard similarity (Figures 71–74) is the same as the one detected in the first one-mode graph. Hence, the structure of the network is not altered, whether only the shared types or the full range of types is considered. The centrality measures (Tables 86, 99, 112, 125 in Appendix III) are exactly the same, or form a similar pattern, in both one-mode graphs for Tell el-Dab'a, Tell el-Yahudiyah, Sedment, Qau el-Kebir, Abydos, the Theban area, Deir el-Ballas, Tell Hebua, and Ain Asil.

Therefore, Tell el-Dab'a, Tell el-Yahudiyah, and Sedment still appear to be the better-connected sites in the network, while Qau el-Kebir is a well-connected site, but not a main player. Moreover, Abydos still looks like an important intermediary in the network, while the Theban area, Deir el-Ballas, Tell Hebua, and Ain Asil seem to share no particular connection in the network, on the basis of the data analysed. At the same time, Tell el-Maskhuta, Rifeh,

and Mostagedda are also among the better-connected sites, scoring in the high or very high ranks for the degree and the eigenvector centrality. Hence, they appear more important when their full range of scarab and seal designs is examined. Also Tell el-Retaba, Matmar, and Hu look more important when their full range of scarab and seal designs is considered. Tell el-Retaba scores very high for the betweenness and the closeness centrality, while Matmar and Hu score in the middle range of the degree and the eigenvector centrality. Thus, Tell el-Retaba looks like an important intermediary, while Matmar and Hu look like well-connected sites, though not among the main players.

### *Summary*

During the Late Second Intermediate Period, the main players in the network created by the scarab and seal designs are Tell el-Dab'a, Tell el-Yahudiyah, and Sedment. Therefore, these sites were the better-connected and could be where the flow of communications in the network could start or end, and where new trends could be created.<sup>110</sup> Also Tell el-Maskhuta, Rifeh, and Mostagedda are in this group, but only when their full range of designs is studied. This implies that part of their scarab and seal designs is shared with the other sites, but it does not include many of the most common types.

At the same time, Abydos and Tell el-Retaba, but this latter only when the full range of designs is considered, seem to be important intermediaries, namely passageways or (re)distribution centres,<sup>111</sup> in the circulation of scarab and seal designs, thus where the objects would be channelled through or (re)distributed from. The pattern of Tell el-Retaba derives from the fact that its scarab and seal designs are shared with other sites, though it does not include many of the most common types.

## THE CORRESPONDENCE ANALYSIS

The results of the analysis of the scarab and seal designs have been examined also through correspondence analysis, to understand if the variety of types recovered at the sites affects the measures calculated in both graphs in this chapter. The results (Appendix IV) for the Late Middle Kingdom confirm the tendency of sites with higher variety of types to score higher for the degree centrality and the eigenvector centrality, while the betweenness centrality is not affected. The tendency increases in the analysis of the Late Second Intermediate Period, probably because the data are fewer. Nevertheless, this tendency decreases for both periods when the scores of the second one-mode

110 Östborn and Gerding 2015.

111 Gjesfeld 2015; Rivers, Knappett, and Evans 2013.

graph are considered. This shows that a larger number of types could mean higher scores, but not necessarily so, and that the results are reliable and not inescapably affected by archaeological bias.

### CONCLUDING REMARKS

For the Late Middle Kingdom, the sites of Lisht, Lahun, Harageh, Esna, Nubt, Elephantine, and probably Tell el-Dab'a, Abydos, and Qau el-Kebir, have been detected as the possible sites where the designs found on scarabs and seals, hence the objects themselves, were made and sent from, or sent to. The circulation of these designs seems to rely mostly on sites in the Memphis-Fayyum area and southern Upper Egypt, with a few probably important sites in Middle Egypt. Considering that Lisht, Lahun, and Harageh were in the area of the capital of the time,<sup>112</sup> and that Elephantine was an important position to enter Nubia, the results are not surprising.

The importance of the sites in the Memphis-Fayyum area during the Late Middle Kingdom, and of Abydos and Esna, is also shown by the presence of scarabs and seals made of imported materials, such as lapis lazuli and obsidian. It is probably significant that lapis lazuli, which comes from modern-day Afghanistan,<sup>113</sup> is found only in the royal tombs in the Memphis-Fayyum area and at Tell el-Dab'a. Obsidian is found in the Aegean, in the Levant, on the Arabian peninsula and in the horn of Africa.<sup>114</sup> The fact that the obsidian objects analysed in the present work have been retrieved from southern Upper Egypt, mostly, and in the Memphis-Fayyum area, suggest that obsidian entered Egypt from the south, thus from the horn of Africa, and was transported to the Memphis-Fayyum through the sites in Upper and Middle Egypt. At the same time, Deir el-Ballas looks like a passageway or a (re)distribution centre in the same network. This implies that the designs on scarabs and seals, thus the objects themselves, could be channelled through there on their way to other sites, or that they were (re)distributed from there.

As far as the materials used to produce scarabs and seals are concerned, amethyst, siltstone, carnelian, and limestone are found near their source. Especially the sources of carnelian and limestone are widely found in Egypt, thus scarabs and seals of these materials are not very informative as far as contacts are concerned. At the same time, jasper and feldspar scarabs and seals are found near their source and in the area of the capital. All this indicates that these materials were not travelling long distances during the Late Middle Kingdom unless it was to reach the area of the capital.

112 Agut and Moreno-García 2016, 249–53; Grajetzki 2004; Quirke 2005.

113 B.G. Aston 1994, 72–73; Aston, Harrell, and Shaw 2000, 39–40; Lucas 1948, 455–56.

114 B.G. Aston 1994, 23–26; Aston, Harrell, and Shaw 2000, 46–47; Lucas 1948, 473–74.

During the Early Second Intermediate Period, Tell el-Dab'a and Abydos are the only two sites connected through the scarab and seal designs, while Ain Asil and Qau el-Kebir appear isolated in this network. This could imply a more localized production of scarab and seal designs, thus of the same scarabs and seals. Nevertheless, the fact that scarabs of amethyst and rock crystal are found in Tell el-Dab'a demonstrates that there were contacts with the areas where these materials could be found, namely in Middle and southern Upper Egypt, the Western Desert, and the Sinai.

During the Late Second Intermediate Period, the main players in the network created by the designs of scarab and seal designs are Tell el-Dab'a, Tell el-Yahudiyah, and Sedment. Therefore, these were the sites where the designs used on scarab and seal designs, hence the objects themselves, could be produced and sent from, or sent to. Also Tell el-Maskhuta, Rifeh, and Mostagedda are in this group, but only when their full range of designs is studied. At the same time, Abydos and Tell el-Retaba, but this latter only when the full range of designs is considered, seem to be important passageways or (re)distribution centres. Therefore, these were the places where the designs, and the same objects, would pass by on their way to their destination, or the places from where they were (re)distributed.

The structure of the network shows that during the Late Second Intermediate Period, contacts were mostly between the sites in the Delta and the ones in Middle Egypt, while contacts between Lower and southern Upper Egypt passed, mostly, by Sedment and Abydos, and less, by Ain Asil. It is possible that this was also the route through which materials used to produce scarabs, namely amethyst, jasper, feldspar, and serpentine, were reaching Lower Egypt from the southern part of the country. Limestone, which is also used for scarabs during this period, is not very informative, because it is widely found in Egypt.