J Forensic Sci, July 2006, Vol. 51, No. 4
doi:10.1111/j.1556-4029.2006.00175.x
Available online at: www.blackwell-synergy.com

Technical Note

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Beyond the Sphere of the English Facial Approximation Literature: Ramifications of German Papers on Western Method Concepts*

ABSTRACT: In the English literature, facial approximation methods have been commonly classified into three types: "Russian," "American," or "Combination." These categorizations are based on the protocols used, for example, whether methods use average soft-tissue depths (American methods) or require face muscle construction (Russian methods). However, literature searches outside the usual realm of English publications reveal key papers that demonstrate that the Russian category above has been founded on distorted views. In reality, Russian methods are based on limited face muscle construction, with heavy reliance on modified average soft-tissue depths. A closer inspection of the American method also reveals inconsistencies with the recognized classification scheme. This investigation thus demonstrates that all major methods of facial approximation depend on both face anatomy and average soft-tissue depths, rendering common method classification schemes redundant. The best way forward appears to be for practitioners to describe the methods they use (including the weight each one gives to average soft-tissue depths and deep face tissue construction) without placing them in any categorical classificatory group or giving them an ambiguous name. The state of this situation may need to be reviewed in the future in light of new research results and paradigms.

KEYWORDS: forensic science, facial reconstruction, facial reproduction, craniofacial identification, skull

Since Prag and Neave's "Making Faces" (1), the terms "Russian" and "American" have become increasingly common in the literature to distinguish between two supposedly different methods of facial approximation (2–4). The terms "morphoscopic/anatomical" and "morphometric/soft-tissue depth" have also been, respectively, used to refer to the techniques more popularly known as "Russian" and "American" (2,5–9). The "Russian method" has been used to describe techniques that rely on the construction of the musculature of the face, whereas the "American method" has been reserved for methods that rely on the use of average soft-tissue depths (1). The terms "Russian" and "American" were originally derived from the geographic locations of defining practitioners' places of work, i.e., Gerasimov and Krogman, respectively. However, it is worth noting that these practitioners may not necessarily have been responsible for the invention of methods and thus the name given to methods is not necessarily tied to the methods place of origin. For example, practitioners responsible for the origin of average soft-tissue depth methods' were centralized about Germany (10–18), not America.

In the past, it has been evident that some methods do not fall neatly into the "Russian/American" classification, but rather combine the two approaches (1,9). For example, average soft-tissue depths are often used as guides to muscle and soft-tissue face construction, so exact averages may not be used (1–4,9,19). To account for this, Stephan and Henneberg (4) and Taylor (2) extended the above classification scheme by independently, but essentially simultaneously, introducing the term "combination method" into the literature in 2001. This development assumed, of course, that the "Russian" and "American" categories were valid. The "Combination method" has since been used to classify techniques where both the average soft-tissue depths and anatomical face structures (primarily the muscles) are represented on the skull (2–4,19), but is this classification system appropriate?

The Enigma of Absent Facial Muscles in Russian Methods

It is commonly understood by practitioners that "Russian" facial approximation methods require the building of the face muscles "one by one" ((3), p. 49) or "muscle by muscle" ((2), p. 341) without the use of average soft tissue depths; for this is reportedly how the founder of the method (Gerasimov) constructed his faces. Curiously, however, images of Gerasimov's partially completed approximations lack the majority of facial muscles with the exception of the masseter and temporalis on each side (20,21). This suggests that Russian methods may not, in reality, represent what they are perceived to be. German literature confirms and expands upon this suspicion.

According to Ullrich (22), a former pupil of Gerasimov, the Russian master indeed built the masseter and temporalis muscles; however, he found "the modeling of individual muscles onto the skull to be highly unsuitable and inaccurate" ((22), p. 256). This

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*Portions of this work have been presented at the 18th International Symposium on the Forensic Sciences, Perth, WA, Australia, April 2006.

Received 29 Jan. 2005; and in revised form 30 Oct. 2005; accepted 31 Dec. 2005; published 21 June 2006.

TABLE 1—*Selected soft-tissue thicknesses (mm) measured by Gerasimov in the median plane on 71 males aged from 8 to 81 years with standards for males and females (as reported by Ullrich (21)).*

Landmark	*n*	Range			Standard Value	
		Mean	Minimum	Maximum	Males	Females
Metopion	71	5.72	4	7.5	6	5
Glabella	71	7.66	6	12	8	6
Nasion	71	6.58	4.5	9	6	5
Rhinion	71	2.99	2	3.5	3	2
Mentolabial sulcus	71	10.03	8	13	9	8
Pogonion	71	10.57	9	13	9	8

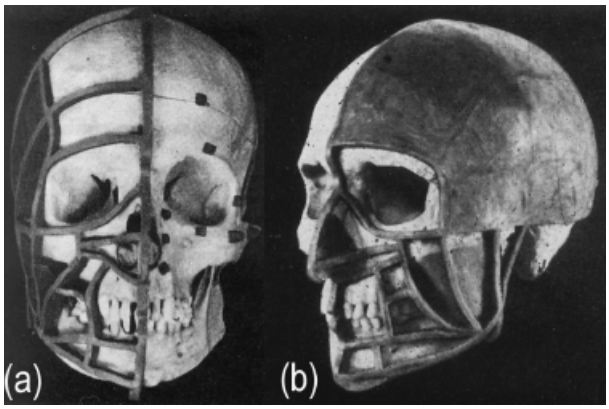

FIG. 1—*The "Russian" method of facial approximation, adapted from Ullrich who trained under Gerasimov. (a) The masseter and temporalis muscles are built on the skull and small wax pyramids are positioned to represent soft-tissue depths modified from the average according to the skulls bony relief (reprinted from [(22) p. 257], with permission from Ullrich H. and Schweizerbart Publishers, http://www.schweizerbart.de). (b) In constructing the face, the wax pyramids are connected together with rectangular strips of modeling material about 5 mm thick to form a meshwork or "comb" over the skull (also seen in (a)). The gaps in the mesh work are then filled in giving the shape of the face to which details of other facial features can be added (reprinted from [(23) p. 115], with permission from Ullrich H. and Ethnographisch-Archäologische Zeitschrift).*

appears to explain why images of Gerasimov's partially completed facial reconstructions only ever show the temporalis and masseter muscles in place. Furthermore, Gerasimov collected his own average soft-tissue depths, not only in the sagittal plane (see Table 1) but also about the Frankfurt horizontal and at five other single landmarks, and used this information to construct his faces (20,22–24). Ullrich ((22), p. 256) reports that "the method of Gerasimov confined itself almost exclusively to the application of soft tissue depths as per the modified standard values and to the reconstruction of the remaining soft facial tissue in accordance with the reciprocal correlations to the skull structure" (see Fig. 1 for key illustrations). Therefore, exact averages were not always used by Gerasimov, but were often adjusted according to the bony "relief" displayed by each individual skull in an attempt to predict the face morphology more accurately (22,23). Consequently, Gerasimov's (20) method is in principle identical to that of Neave's (1). Both rely upon some muscle construction and the use of average soft-tissue depths as guides (1,22–24; see Fig. 2). The so-called "Russian" (or "morphoscopic" or "anatomical") methods are, therefore, "combination" techniques as witnessed by the inclusion of average soft-tissue depths in methods (22,23). At no time in the past has the literature indicated that any facial approximation method *only* relying on the muscles of the face and other face anatomy for face construction has become broadly established. Thus, the frequently cited category of "Russian" (or "Anatomical/Morphoscopic") method in the literature is no more than a figment of the imagination.

Are American Methods Really American?

The above finding that the Russian facial approximation category is not robust draws attention to its counterpart, the American method. If this method is valid, one would expect the founder of this method (Krogman) to have adhered to the guidelines dictated by the classification scheme (i.e., use of soft-tissue depths alone). However, Krogman (25) stressed the need to "[keep] an eye on the general architecture of the skull, and the mind's eye focused on the sculptress' own sense of touch and *proportion*, developed through *anatomical studies* and art training" (emphasis added).

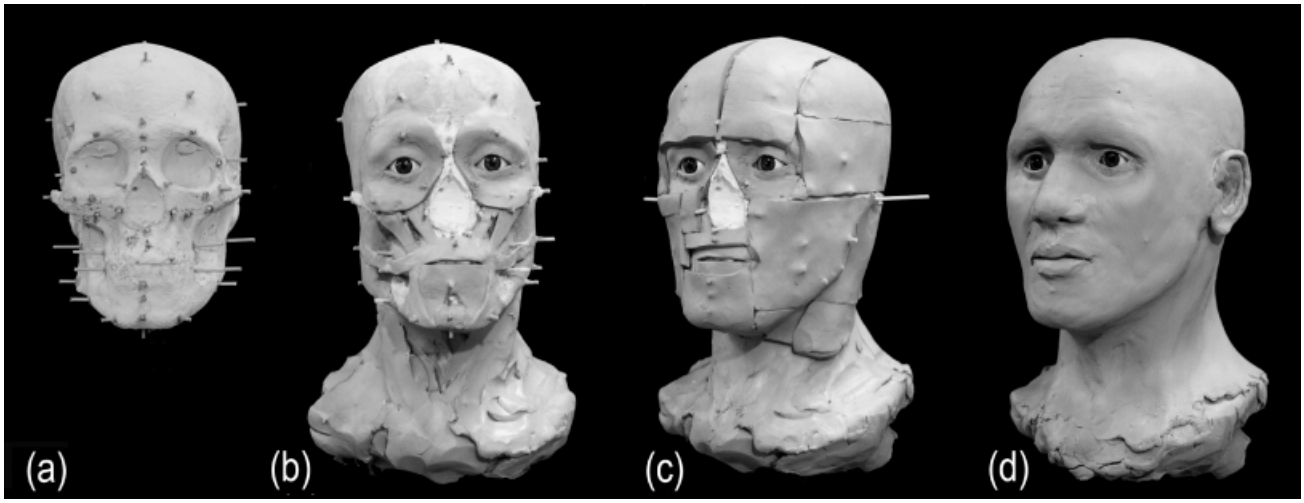

FIG. 2—*Facial approximation construction sequence following the methods of Neave and illustrating the need to modify average soft tissue depths at some landmarks. Image demonstrates sequence from bare skull cast (a) through to final face (d). The over-projection of average soft tissue depths on the left side of the head (b, c) are due to skull asymmetry resulting from mastication muscle atrophy. These depths have thus been trimmed in the final face (d). This method is in essence identical to that of Gerasimov's (see Fig. 1), where some muscles are built onto the skull with the average soft tissue depths modified according to the skull's morphology. Note that eyes in this facial approximation are too deeply set due to the construction of the face prior to 2002, which resulted in the employment of inaccurate and now outdated guidelines.*

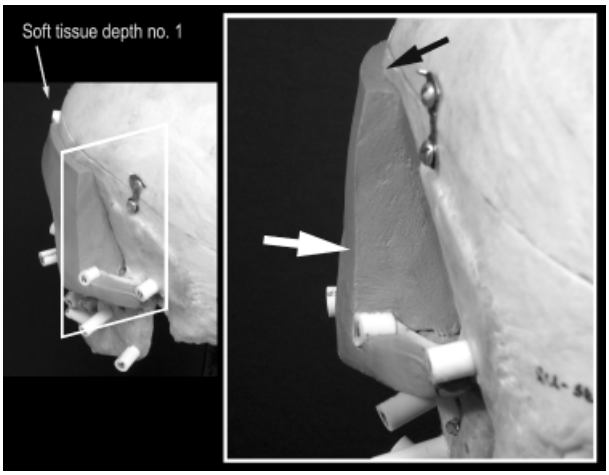

FIG. 3—*Facial approximation "cut away" to show soft-tissue representation over the region of the temporal fossa when using American methods. Note that simple linear joining of the metopion soft-tissue depth (no. 1) with that of zygion (no. 16) would be insufficient for realistic face representation; at least some basic knowledge of head form, i.e., anatomy, must be used. For example, a decision must be made by the practitioner where to deviate from the metopion soft-tissue depth on the lateral side of the head when moving down the skull vault into the temporal fossa. Logically, this decision appears to be best made in accordance with the location of the underlying temporalis muscle marked by the superior temporal line (enlargement: black arrow). Furthermore, for anatomically realistic heads, the surface contour of the soft tissue in the temporal region is not simply represented by a single curve following that of the callote above or centered about one fixed point. Moving from superior and latero-inferiorlly, the soft-tissue contour encompasses the temporalis muscle but the curve becomes reduced in contrast to that covering the callote. Then, as the soft tissue approaches the zygomatic arch, it bulges to encompass it, giving a very subtle but significant flexion point (enlargement: white arrow). This allows the zygomatic bones to "show through" the face, and contributes to its structure as can be commonly observed on living people who are not overtly fat.*

Thus, it seems anatomical knowledge played a major role in American methods in addition to average soft-tissue depths. Such conclusions are reinforced by Taylor (2), a renowned practitioner in the field of American methods, in statements indicating that the construction of facial approximations using soft-tissue depths requires anatomical knowledge even if the muscles are not directly constructed on the skull. This is further verified as the bone typology can change dramatically between landmarks used for averaging and thus some knowledge of face anatomy must be used if the frequently used sparse average soft tissue depths are to be connected in ways that represent realistic face contours (see e.g., Fig. 3). Therefore, American techniques also fall into the class of "combination" methods because they depend on face anatomy and average soft tissue depths.

Conclusions

A review of the original literature and current methods demonstrates that methods of facial approximation popularly classified as either "American" or "Russian" incorporate both approaches and are, therefore, one of the same kind. Facial approximation methods are found to vary along a "combination" technique continuum, with all methods relying on soft-tissue depth information and anatomical knowledge to some degree. Consequently, the terms "American" and "Russian" (morphometric/morphoscopic and soft-tissue depth/anatomical, respectively) are inappropriate, imprecise, and should be avoided.

Like for anatomical eponyms (26), the poor indication by locality terms of what methods actually represent or entail also indicates that the names "Russian" and "American" should be avoided. The need to abandon locality terms such as "Russian" and "American" will become further evident in the future if practitioners continue to follow recent trends of naming their methods after practitioner locations when the fundamentals of methods do not differ (see e.g., the "British" (27) or the "Manchester" method (3) and the "Melbourne" method (28), all of which clearly use muscle construction in conjunction with average soft-tissue depths). Furthermore, the recent call for the subdivision of methods into discrete entities named "facial reconstruction" and "facial approximation" (29) is unjustifiable given current method abilities and is also confusing given that these terms have been used interchangeably in the past.

As all facial approximation methods proposed to this date are grounded on the same fundamentals (i.e., face anatomy *and* average soft-tissue depths), none should be separately categorized. As the single most important factor in method description is not who first used the method, or the location at which it was originally developed, but what the method actually entails, techniques of facial approximation should be described in specific detail without methods being ambiguously named. Although current facial approximation methods rely on soft-tissue depths and anatomical face structures to different degrees, the term "combination technique" should also be avoided as this implies that the terms "Russian/anatomical/morphoscopic" and "American/soft-tissue depth/morphometric" are valid entities—which they are not. This situation may need to be reassessed in the future as new research paradigms develop.

Acknowledgments

Special thanks are due to two anonymous reviewers who provided helpful comments that strengthened the manuscript. It should also be noted that translations from German papers cited herein were conducted by the author and cross checked with independent translations produced by German Language Services, Kingswood, South Australia.

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