

Kung Fu Panda 3: Mandarin Lip-sync Reanimation Process and Pipeline

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Figure 1: Example frame of the English version, the Mandarin version and a luminance anaglyph illustrating the reanimation differences.

Abstract

For *Kung Fu Panda 3* we produced an alternate version reanimated with Mandarin dialog, the first of its kind. This presented unique production challenges for both DreamWorks Animation (DWA) and Oriental DreamWorks (ODW), as each has their own pipeline and toolset. With the goal of achieving the same quality level across both versions within budget and schedule, workflows and tools were developed to effectively track, transfer and unpack the necessary data between sites.

Keywords: feature animation, film, china, coproduction, lip-sync, reanimation

Concepts: •Computing methodologies → Animation; Rendering;

1 Overall Workflow

Parameters were set to limit the scope of the tasks involved but still create a high quality Mandarin version. Only a single editorial cut was produced to limit the volatility due to story and production changes. In addition, only the character mouths for lip-sync and subsequent surrounding geometry would be reanimated. However, since *Kung Fu Panda 3* at DWA used proprietary animation, lighting and rendering software, the work and data needed to be carefully compartmentalized. Editorial data from DWA for the English version was shared with ODW to determine Mandarin timing, characters requiring dialog updates, and to build production shots. For all speaking characters, DWA proprietary rigging data was output as Alembic blend shapes for replicating facial animation rigs at ODW. DWA animation models were created with and without the lower face animation as caches to be transferred and ingested at ODW. After ODW completed Mandarin reanimation, new caches were sent back to be ingested and rendered at DWA.

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2 Rigging Pipeline

From a neutral pose, a series of animation parameters were applied to DWA character rigs to bake out models representing various pose shapes. These included a per-frame transform hierarchy to allow the Mandarin face rigs to be aligned in world space during shot production. Utilizing Alembic and FBX this information was transferred to ODW for the rigging team to develop Mandarin face rigs. Using the transform hierarchy, pose shapes, and a custom Maya plugin, a delta-based Maya rig was developed for animation. The rig delivered an additional level of quality control by enabling animators to view the English animation and visualize the changes between Mandarin and English as a heat map. By utilizing DWA approved controls, we gained consistency across the animation maintaining coherency and quality. Since the Mandarin reanimation performance of a character would affect the mouths along with the cheeks, jaw, neck and other surrounding geometry, animators were provided with paint tools via the ODW deformer to blend between the models. Particularly for the fat panda faces and necks, this avoided collisions with approved English clothing simulations or other interactions. Only a subset of shots required additional Character FX (chin/body collisions) or FX (cold breath elements) work for the Mandarin version.

3 Data Transfer System

In order to provide a robust transfer mechanism that met our security requirements, TDs developed a system in python named courier. With both a web interface and an API for TDs, artists could automate processes to reliably ship arbitrary or tagged data. Key components included predefined 'Manifests', validation checks at both the sending and receiving ends, transfer protocol agnostic, support for tags and labels, and hooks for both packaging and ingesting datasets. An example Manifest for a DWA Character Package for rigging would include several predefined Alembic caches, a set of preview texture maps, and an XML file providing key joint locations all bundled as a single .tar file. The Manifests could be validated prior to sending to ensure they were correctly formatted to avoid delays in production due to the time offset between sites. Since packages were tagged properly, they could be automatically unpacked and ingested at ODW or DWA even before artists arrived.

4 Rendering and Deliveries

Once ODW Mandarin lip-sync animation was complete and the associated Alembic caches sent back to DWA via courier, the char-

acter layers would be rendered and composited into the Mandarin versions of the shots by a small dedicated team. Tools were developed to generate fast render versions of Mandarin data to compare against the English takes to spot discrepancies. These were shot as stereo pair movies making it easy to see differences between the language versions. In order to avoid wasted rendering cycles, Mandarin shots in general were dependent on final lighting approval from their English counterparts. Wherever possible, deep data was used to alleviate extra work for character holdouts. Color grading occurs in-house at DWA so image finaling and DI mattes were replicated for final delivery as well.