Centre for Next Generation Localisation

Introduction to Post-Editing: Who, What, How and Where to Next?

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Definitions of Post-Editing

- The "term used for the correction of machine translation output by human linguists/editors" (Veale and Way 1997)
- "…the process of improving a machine-generated translation with a minimum of manual labor" (TAUS report, 2010)
- A process of *modification* rather than *revision*. (Loffler-Laurian 1985)
- *Repairing* texts (Krings, 2001)

Different from “Pre-editing”

- **Pre**-editing: modifying the input text *before* automatic translation to facilitate machine processing
- Pre-editing techniques include:
  - Use of style guides
  - Use of controlled terminology
  - Use of controlled language rules

Different from “Revision”?

- Overlaps, but differences too:
  - Differences:
    - Types of errors
    - Time available
    - Level of final quality

Different from “Revision”?

- Overlaps?
  - Revisers check for (Mossop 2001):
    - Accuracy
    - Completeness
    - Logic
    - Facts
    - Smoothness (cohesion)
    - Tailoring (target audience)
    - Style
    - Idiom
    - Mechanics (grammar etc.)
    - Layout
    - Typography
    - Organisation

Degrees of Post-Editing

- “Fast Post-Editing”:
  - Quick turn-around
  - Essential corrections only
- Also called:
  - Gist Post-Editing
  - Rapid Post-Editing
  - Light Post-Editing

Degrees of Post-Editing

- "Conventional Post-Editing":
  - Slower turn-around
  - More corrections leading to higher quality
- Also called:
  - Full Post-Editing

Degrees of Post-Editing

- Decided by:
  - User Requirements
  - Volume
  - Quality Expectations
  - Turn-Around Time
  - Perishability
  - Text Function

(Allen 2002)

Light vs. Full?

- Is the distinction useful?
  - Evidence that most MT users engage in full post-editing (TAUS Report 2010)
  - Scenarios for light post-editing are few?
  - Raw MT or Full post-edit?

Source Text	Raw MT
Un vaste réseau qui piratait les codes de déverrouillage des téléphones portables a été démantelé, ont annoncé, dimanche 26 septembre, les enquêteurs.	A vast network hacked unlock codes for mobile phones has been dismantled, announced Sunday, Sept. 26, investigators.
Example of Light Post-Edit	A vast network which hacked unlock codes for mobile phones has been dismantled, it was announced Sunday, Sept. 26, by investigators.
Example of Full Post-Edit	A vast network which hacked security codes for mobile phones has been dismantled, according to an announcement by investigators on Sunday, Sept. 26.

Examples of post-edited text

- ST: If an error occurred, the error code is displayed.
- MT: Si une erreur se produit, le code d'erreur est affichée.
- MT: Si une erreur se produit, le code d'erreur est affichée.
- PE: Si une erreur se produit, le code d'erreur est affiché.

Examples of post-edited text

- ST: Click this to decompress, or expand, compressed files as they are backed up.
- MT: Cliquez sur cette option pour decompress ou développer, les fichiers compressés ils sont sauvegardés.
- MT: Cliquez sur cette option pour decompress ou développer, (ø) les fichiers compressés ils sont sauvegardés.
- PE: Cliquez sur cette option pour décompresser ou développer les fichiers compressés, tandis qu'ils sont sauvegardés.

Examples of post-edited text

- English-German: Example of variability across PE solutions:
  - ST Select the C drive.
  - MT Wählen Sie das **C- Laufwerk** aus.
  - P1 Wählen Sie **-Laufwerk C** aus.
  - P2 Wählen Sie das **Laufwerk C** aus.
  - P3 Wählen Sie das **C- Laufwerk** aus.
  - P4 Wählen Sie das **C- Laufwerk** aus.
  - P5 Wählen Sie das **C- Laufwerk** aus.
  - P6 Wählen Sie das **Laufwerk "C:"** aus
  - P7 Wählen Sie das **Laufwerk C** aus.
  - P8 Wählen Sie das **Laufwerk C:** aus.
  - P9 **Wechseln Sie zu -Laufwerk C-**

Examples of post-edited text

- English-Japanese (from Midori Tatsumi's PhD work) – Example of pronoun being replaced by noun

- *ST: You must have the Folder Full Control role in the folder to give other users access to it.*
- *MT: それへの他のユーザーアクセスを与えるフォルダのフォルダのフルコントロールのロールを持たなければなりません。[Gloss: it]*
- *PE: フォルダへの他のユーザーアクセスを与えるにはそのフォルダのフルコントロールのロールを持たなければなりません。[Gloss: folder]*

Examples of post-edited text

- Example of a phrase being shifted from one location to another to increase naturalness of text

- *ST: … show data ingestion progress, and the status of the automatic categorization.*
- *MT: …自動類別のデータ取り込みの進行状況とステータスを現します。 […show data ingestion progress of the automatic categorization and the status]*
- *PE: …データ取り込みの進行状況と自動類別のステータスを現します。 […show data ingestion progress and the status of the automatic categorization]*

Quality Expectations

- The received wisdom:
  - MT + PE will *generally* not produce the same high level quality as HT + revision
  - But, things are changing…?
- Raw MT quality & PE effort will vary depending on:
  - System
  - Language Pair
  - Domain
  - Text Type
  - Degree of control of input text
    - Degree of *suitability?*

Quality Expectations: System-Type Dependencies

RBMT Systems:

- Level of dictionary coding
- Level of linguistic coding via rules
- Customisability
- Quality of source input

Data-Driven Systems

- Quality of training data
- Domain of training data
- Volume of training data
- Linguistic rules

Terminology, Terminology, Terminology

Quality Expectations: System-Type Errors

RBMT Systems:

- Incorrect word/term selected
- Incorrect attachment (e.g. of preposition phrases)
- Meaning is not disambiguated

Data-Driven Systems

- Words added
- Words omitted
- Loss of capitalisation
- Loss/incorrect punctuation
- Some phrases very fluent, others not at all

Quality – Different User Perspectives

Role	Method	Tools
Developer	Automatic Metrics	BLEU, NIST, TER, GTM…
User	Utility, Acceptability	User surveys, crowd consensus
Buyer	Financial, practical	ROI, throughput, standard quality measurements
Linguist/LSP	Financial, Human evaluation	Word rate, productivity, standard quality measurements

TAUS Report 2010

Ways of Measuring Quality for PE

- Types of errors:
  - Compares source text with raw MT output
- Changes made:
  - Compares post-edited text with raw MT output
- Estimated effort:
  - Compares source text with raw MT output and qualitatively estimates PE effort

Ways of Measuring Quality for PE

- Which method is best?
  - Types of errors:
    - Good for system development
  - Changes made:
    - Good for system development
    - Good for post-task assessment of effort
  - Estimated effort:
    - Good for estimating PE productivity prior to task commencement

Ways of Measuring Quality for PE

- A note on automatic metrics:

  - Different “currency” from “Fuzzy Match” method
  - Further research on correlations between metrics and PE effort required

Quality – Classifying Errors for PE

- Minor, Major, Grey (Green 1982)
- Single word errors; errors of relation; structural or informational errors (Loffler-Laurian 1983)
- Incorrect verb forms, mistranslation of prepositions, literal rendition of common idioms, consistent translation of a word in one manner when context demands another (Lavorel 1982)

Quality – Types of Changes Made

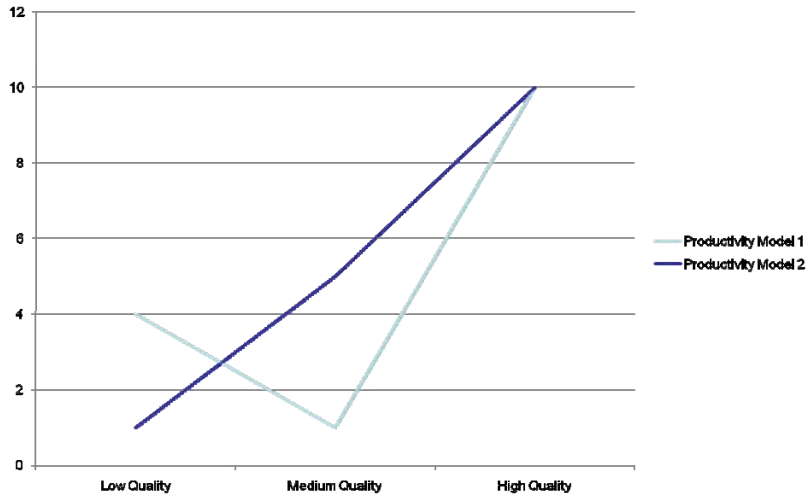
- De Almeida & O'Brien 2010: Pilot Study - Preliminary Findings:
- Based on LISA QA model

Essential changes	French	Spanish
Accuracy	17%	21%
Consistency	6%	2%
Format	13%	13%
Language	49%	47%
Mistranslation	13%	12%
Terminology	2%	3%

Quality – Estimated Post-Editing Effort

- E.g. Symantec's Human evaluation metrics
  - Four categories:
    - Excellent
    - Good
    - Medium
    - Poor

Managing Expectations – Quality vs. Productivity?



Managing Expectations – Quality vs. Productivity?

- Krings (2001):
  - Some evidence to suggest that medium quality MT output was more demanding than poor quality.
  - The relationship between number of errors and post-editing difficulty is not linear, but exponential.

Managing Expectations - Productivity

- How do you measure post-editing effort?
  - Temporal measurement only?
  - +Technical
  - +Cognitive
- Recurring questions:
  - Is post-editing throughput faster than translation?
  - Is post-editing more or less keyboard intensive than translation?
  - Is post-editing more or less cognitively demanding than translation?

Managing Expectations - Productivity

- Is post-editing throughput faster than translation?
  - Resounding evidence: Yes
  - Throughput rates vary from:
    - 3,000 to 9,000 words per day

Managing Expectations - Productivity

- Is post-editing throughput faster than translation?
  - But:
    - Comparisons are often of first pass translation vs. post-editing, i.e. no revision
    - You will see individual variation
    - It will vary across systems and languages
    - And, one important question remains:
      - Can these throughput rates be sustained over one day, the entire week, or several months?

Managing Expectations - Productivity

- Is post-editing more or less keyboard intensive than translation?
  - Experiments using keyboard logging
    - (e.g. Autodesk, De Almeida & O'Brien 2010, O'Brien 2006)
  - Post-editing clearly involves less *typing* than translation
  - But, note that translators are usually very fast typists anyway

Managing Expectations - Productivity

- Is post-editing more or less cognitively demanding than translation?
  - Rarely considered (cf. research agenda)
  - Translators report being "more tired" after post-editing –three texts vs. two
  - PE is "more tedious"?

Managing Expectations – Pricing Methods

- Two most popular approaches (TAUS 2010):
  - Paying as fuzzy segment matches
  - Paying a fee based on time spent
- Variations on the per word/segment rate:
  - Between 15% and 25% of Fuzzy Match rate
  - Per-word discount on price
  - Percentage of no-match word rate
  - 50% of human translation rate
  - Rate based on productivity

Managing Expectations – Pricing Methods

- Important Questions on Pricing Methods:
  - Is the level of effort required for post-editing comparable with Fuzzy Match editing?
  - At what level of Fuzzy Match (50%, 70%, 80%..)?

Linking Quality, & Productivity to Levels of PE

Light Post-Editing

- Low to medium quality
- Throughput could be at least double normal translation rate?

Full Post-Editing

- Medium to high quality
- Throughput could be faster than translation, but rate would probably be lower than rate for “light” edits

Post-Editing Guidelines – Current Challenges

- No standard guidelines
- Guidelines tend to be too vague or too detailed
- The “2-second” rule is unhelpful

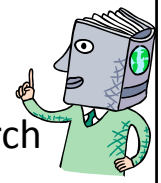
Post-Editing Guidelines – Current Challenges

- Guidelines may need to be system- and language-specific
- How to differentiate between essential and preferential changes?

- How to differentiate guidelines for different degrees of post-editing?

Post-Editing Guidelines (General)

- Retain as much raw translation as possible
- Don't hesitate too long over a problem
- Don't worry about style (?)
- Don't embark on time-consuming research
- Make changes only where absolutely necessary,
  - i.e. correct words or phrases that are (a) nonsensical, (b) wrong, (c) omitted or added unnecessarily, and if there's enough time, (d) ambiguous.



Post-Editing Guidelines (Light)

- The message transferred should be accurate
- Grammatical problems are not a big concern, unless they interfere with accuracy
- Ignore stylistic problems
- Do not spend time researching terms
- Edit any offensive, inappropriate or culturally unacceptable information
- All basic rules regarding spelling still apply
- Textual standards (cohesion, coherence, standard word order etc.) are not so important
- Throughput expectations: very high
- Quality expectations: low

Post-Editing Guidelines (Full)

- The message transferred should be accurate
- Grammar should be accurate
- Ignore stylistic and textuality problems
- Ensure that key terminology is correctly translated
- Edit any offensive, inappropriate or culturally unacceptable information
- All basic rules regarding spelling, punctuation and hyphenation still apply
- For tagged formats, ensure all tags are present and in the correct positions
- Throughput expectations: high
- Quality expectations: medium

Training – Current Challenges

- Who is the best post-editor?
- Where should training be done?
- What training is required?
- Disconnects between translation professionalism and post-editing demands

Training – Current Challenges

- Who is the best post-editor?
- My intuition:
  - Good post-editor = good translator, but…

Training – Current Challenges

- Who is the best post-editor?
  - Evidence suggests that less-experienced translators may benefit more from MT than long-term professional translators
  - More experience = faster, but…
  - More experience = more preferential (i.e. stylistic) changes
  - More experience sometimes = negative opinion of MT & PE
  - Are bilinguals to be preferred over translators?
    - Some may be good post-editors, others will not be good (i.e. same as translation community)
    - If PE is mixed with HT in a TM environment, translators are still preferred

Training – Skill set

- Excellent knowledge of SL (≡ translator)
- Excellent command of TL (≡ translator)
- Specialised domain knowledge (≡ translator)
- Excellent key-boarding skills (≡ translator)
- Good revision skills
- Ability to make quick quality assessment and to adhere to guidelines
- Tolerance
- Positive attitude to MT

Training – Where should it be done?

- We are in transition…
  - Currently: mostly in-house, on-the-job
  - Post-editing is creeping into university curricula

Disconnects between translation and post-editing

- Essentially, translators are asked to unlearn much of what they are taught regarding quality and professionalism:
  - Ignore style, fluency, cohesion, coherence, text function, context, end user…
  - Do more, of lower quality, for much less pay
- Post-editors are “self-selecting”
- Post-editing is best mixed with “regular” translation
- Success: post-editors are “part of” the dialogue and process

PE Tools & User Interface

- Is there really a need for a “Post-Editing Tool”?
- Translators like *familiarity*, so
  - Post-editing in familiar editing environments is a plus
  - Also, current workflow usually involves integration with TM environment

PE Tools & User Interface

- Benefits of post-editing in TM environment:
  - Familiarity
  - Mixing HT and MT
  - Access to approved glossary
  - Edits recorded in TM
    - subsequent use for training MT
  - Context

Alternatives

- E.g. PAHO's use of MS Word, customised toolbar for PE
  - Statistics for post-editor
  - Customised Search and Replace
  - Browse related dictionaries
  - Switch right and left
  - Lower/upper case change
  - Delete next *the*
  - Change *its* to *their* etc.
  - Send problem report to system developers

Alternatives

- Re- or de-capitalize
- Change inflection (plural vs. singular)
- Change gender
- Add/delete punctuation symbol
- Change word order
- Change formatting
- Remove/add words

Research Agenda – A Selection of Questions

- What UI support would post-editors benefit from?
- Does controlling source input reduce PE effort?
- How does cognitive effort for post-editing compare with fuzzy match effort?
- Are there correlations between automatic MT metrics and post-editing effort?
- Can reviewers differentiate between human translation and MT+PE?
- Can MT automatic confidence scores accurately predict PE effort?
- How do we best deliver training for PE?
- Is there a particular psychological profile most suited for PE?
- How do you get translators to buy into MT/PE?
- How do you (fairly?) price PE?
- Can Statistical Post-Editing (SPE) really help reduce PE effort?

Research Agenda

- What UI support would post-editors benefit from?
  - Not necessarily keyboarding support (Karamanis et al 2010)
  - Is predictive matching *really* useful to post-editors (e.g. Koehn and Haddow 2009, Caitra experiment)?
  - Support similar to PAHO's Word macros?
  - Confidence scores from MT system which are calibrated with PE effort?
  - Highlighting of typical errors?
  - Automatic feedback to system developers?

Research Agenda

- Does controlling source input reduce PE effort?
  - Yes (O'Brien 2006)
  - But, controlling source is not an easy task
  - Some controls are more effective than others
  - It does not eliminate PE
  - New question: relation between controlled source and SMT?

Research Agenda

- How does PE cognitive effort compare with editing Fuzzy Matches?
  - Similar to 80-90% fuzzy match for *high quality* raw output (O'Brien 2006)?
  - If so, what are the pricing implications?

Research Agenda

- Are there correlations between automatic metrics and post-editing effort?
  - Preliminary tests suggest there might be correlations between low and high GTM scores, but medium level GTM scores were questionable (O'Brien, forthcoming?)
    - Is medium-quality MT harder to process than low/high quality?
    - If so, what are the implications for pricing?

Research Agenda

- Can reviewers differentiate between HT and MT+PE
  - No (Autodesk Experiment)
  - No (Fiederer and O'Brien, 2009)
    - But they have a distinct preference for HT when *style* is taken into consideration

Research Agenda

- Can Statistical Post-Editing (SPE) really help reduce PE effort?
  - Current research shows significant improvements in automatic metrics (Dugast et al. 2007, Roturier and Senellart 2008)
  - Little research on correlations with human PE effort

Research Agenda

- Can MT automatic confidence scores accurately predict PE effort?
  - Very little research to date
  - Where is the best place to put an MT confidence score?
  - Preliminary study (O'Brien, forthcoming?) suggests that translators want to see scores in a *familiar* format, i.e. Fuzzy Match %, not 0.5391

Research Agenda

- How do you get translators to buy into MT/PE?
  - Learn from the success stories, e.g. PAHO, Symantec
  - Commonalities:
    - Long-term project, hard work
    - Buy-in from technical writers
    - Ongoing research
    - Attempts to unify processes (n.b. terminology)
    - Evolving guidelines
    - Incorporation of feedback from post-editors
  - Give post-editors *a stake in* the process

Research Agenda

- How do you (fairly?) price PE?
  - Empirical research into post-editing effort (not just throughput based measurements)
  - Question assumptions about linearity of quality/productivity